VOL. XX. NO. 5 JUNE, 1948

THE TOOL ENGINEER

OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS

Departments

Behind every manufactured product is the tool engineer

Even *good* gaging can be done *better* with equipment like this

In almost any metalworking plant, there are certain gaging operations that will be improved when the present gages are retired. That goes even for the finest standard gages ever made — and by that we mean our own.

To take their place, Pratt & Whitney offers specially-built multiple gages like the one shown. This one is a happy combination of three P&W gaging methods — Electrolimit, Air-O-Limit, and Electrical Contact — that checks 14 dimensions of a piston. It quickly paid for itself because it eliminated many wasteful inspections; it takes one experienced inspector instead of fourteen.

Do you produce a part with a number of precise dimensions around which we could build such a gage? If so, you can save money. P&W can provide the gage you need — special or standard. Feel free to call on us for counsel on any gaging problem.

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Division Niles-Bement-Pond Co.
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Pratt & Whitney Gage Engineering

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The Tool Engineer

Official Publication: American Society of Tool Engineers

June, 1948

Vol. XX, No. 5

Editorial

Tool Engineering's Sesqui-Centennial

THIS MONTH MARKS the 150th anniversary of the beginning of modern tool engineering.

It was in June 1798 that Eli Whitney received a contract for the manufacture of 10,000 muskets for the United States Army. In fulfilling this contract he introduced to the world the methods of mass production and the principle of interchangeable manufacture.

Those were perilous days for the young and struggling republic. The friendly French government of Revolutionary days had been replaced by the Directory which sought to take advantage of our national youth and weakness. Their ships preyed upon our commerce, driving American ships into their harbors and seizing the cargo.

On the diplomatic side came the notorious XYZ affair which led Charles Pinckney, one of the insulted American envoys on the special mission to France, to utter his historic declaration: "Millions for defense, but not one cent for tribute!"

Congress took steps to provide for this defense. They authorized a military force 80,000 strong and recalled General Washington from retirement to lead it. Those were the seemingly important acts of the day. But when the Congress let a series of 27 contracts to procure 40,200 muskets, they unknowingly paved the way for America's industrial, economic and cultural greatness, because one of these contracts enabled Eli Whitney to put into operation his methods of mass manufacture.

Whitney's mechanical genius had been recognized because of his development of the cotton gin, but with this machine he had encountered business difficulties and did not feel he could rely upon it for his financial future. Determining to seek a new business, he wrote to the Secretary of the Treasury, Oliver Wolcott, to enlist his support in securing a contract for muskets.

"I am persuaded," he wrote, "that machinery moved by water adapted to this business, would greatly diminish the labor and facilitate the manufacturing of this article. Machines for forging, rolling, floating, boring, grinding, polishing, etc., may be made use of to advantage."

This statement, plus the fact that he insisted upon a later initial delivery date in his contract, proves that from the beginning he planned to set up the new production method and realized that it would take time to put it into operation.

Prior to Whitney's appearance in the musket production field, these commodities were custom made pieces, fashioned by highly skilled craftsmen. In a period of some two and a half years previous to the contracts of 1798 the Springfield Arsenal had produced only 245 muskets.

The system Whitney set up to produce component parts which would fit equally well into the assembly of any musket was fundamentally that upon which mass production is based today. The only difference is that his crude machines and measuring methods have been replaced by automatic machines and gaging devices of incredibly close tolerances.

Eli Whitney was the pioneer tool engineer. His factory continued his methods after his death, but the idea did not spread rapidly. As late as 1860 the Encyclopedia of Mechanics described the Whitney firearm production system in terms of wonder. The editor wrote:

"The metal is wrought into the most eccentric shapes, without any further intervention of human hands than is requisite for superintending the machine. Owing to this skillful arrangement of machinery, only 35 men are required to carry on the works, turning out 30,000 rifles a year, worth about $13 each."

Thus, we see how tool engineering came into industrial importance, even if not at the time recognized by that name. Here was production of more and better goods with less labor and at lower cost.

In the 150 years since Whitney received the famous contract, his ideas have been carried on and developed by thousands of tool engineers, until the United States has become the world's foremost producer of goods and achieved the world's highest standards of living.

I. F. Holland

President 1948-49

THE TOOL ENGINEER is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879. Yearly subscription, $2.00. Non-members, $6.00. Canada, $6.50; all other foreign countries, $8.00 per year.

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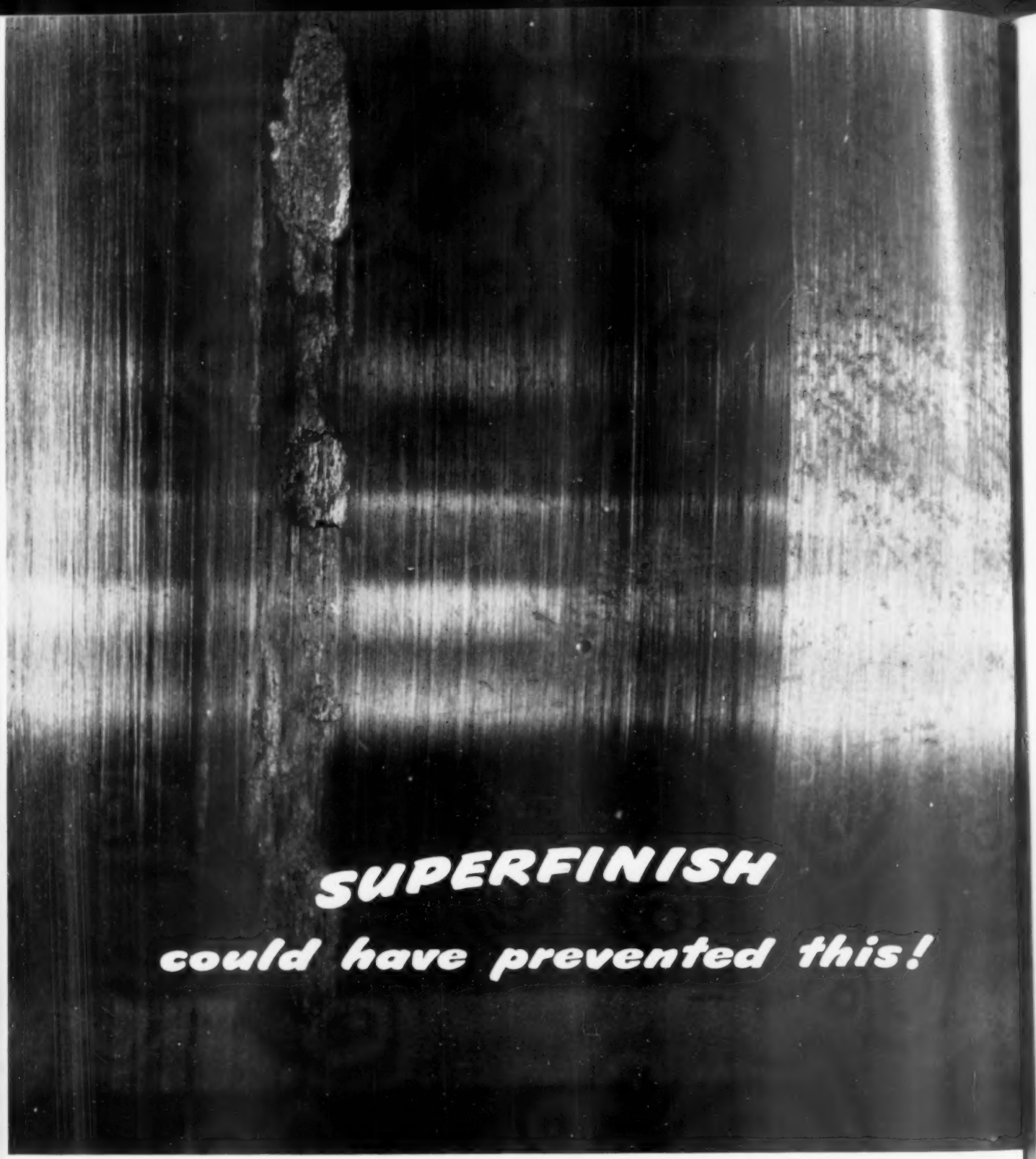

Enlargement shows a scored and galled surface of a 3½" O.D. bearing that "froze" and failed. Had this surface first been Superfinished, it would have had nearly twice the load-bearing capacity and about three times the life. "Wear and Surface Finish," is a new textbook on Superfinish. Write for it on your company letterhead.

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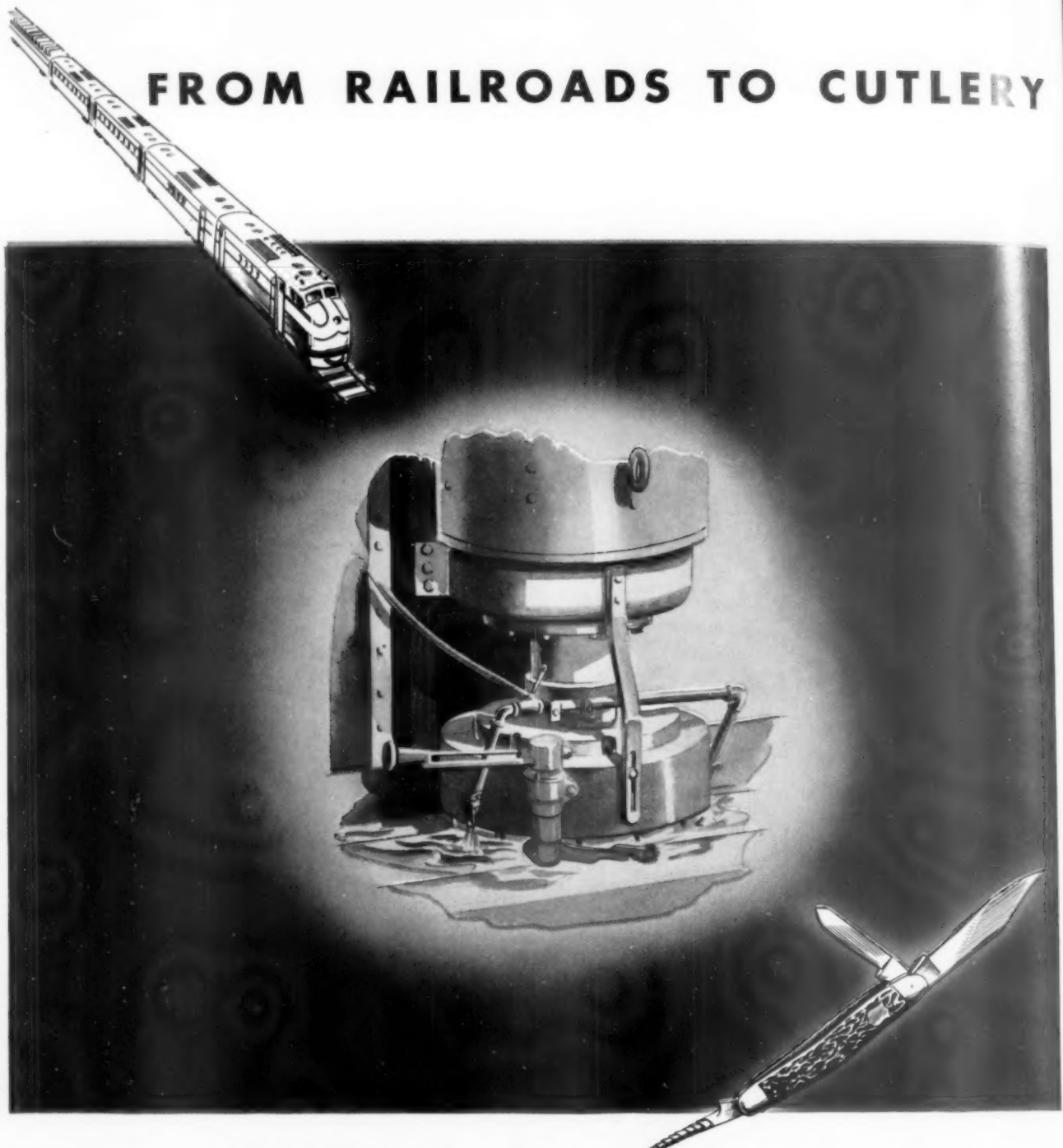

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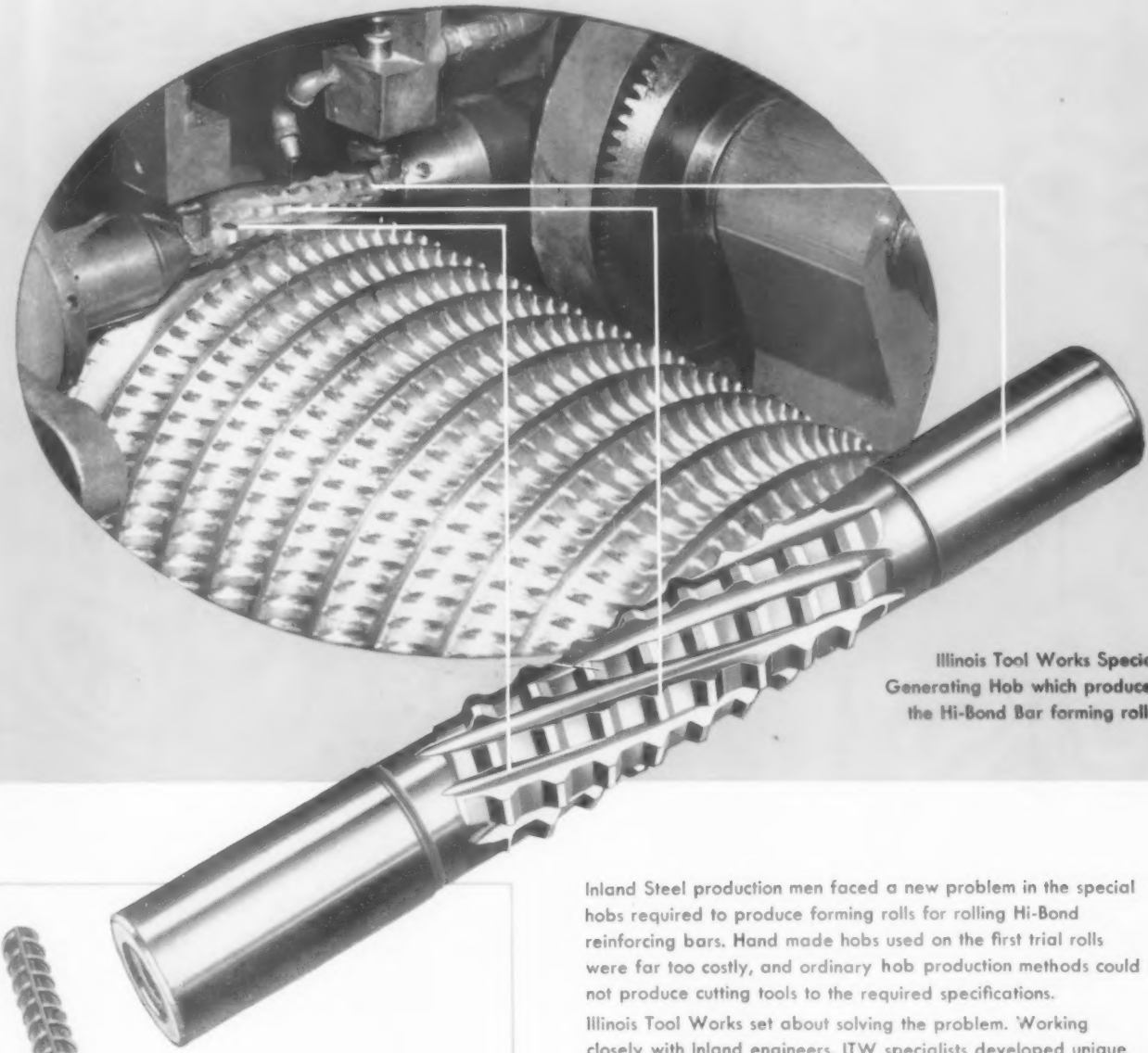
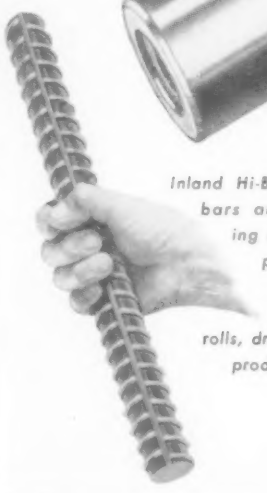


Illinois Tool Works Special Generating Hob which produces the Hi-Bond Bar forming rolls.



Inland Hi-Bond concrete reinforcing bars are produced to exacting dimensional standards by precision rolls like that shown being hobbed above. A set of two rolls, dressed and re-hobbed, will produce about 10,000 tons of finished Hi-Bond bars!

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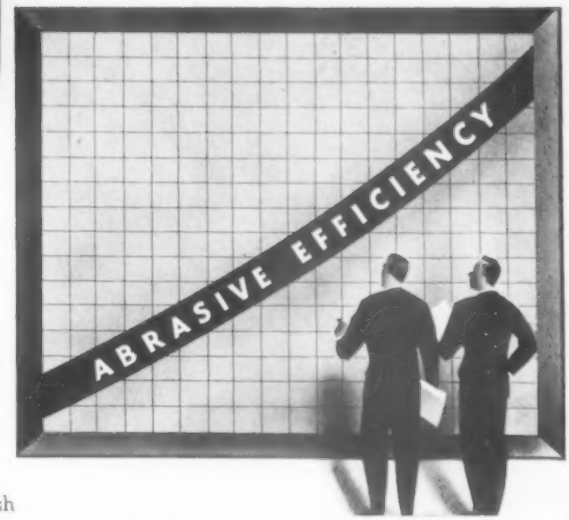

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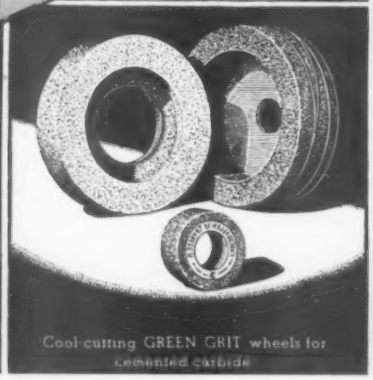

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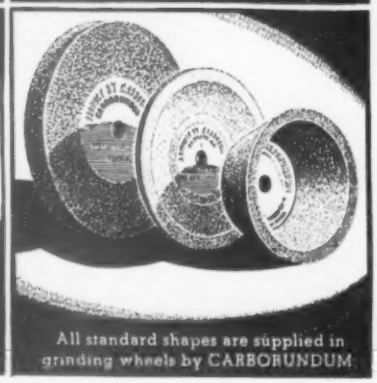
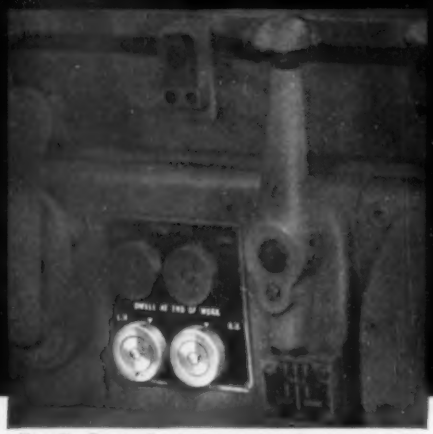


All standard shapes are supplied in grinding wheels by CARBORUNDUM.

5 More Reasons for



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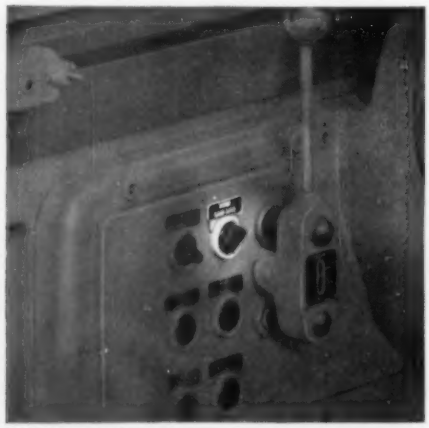

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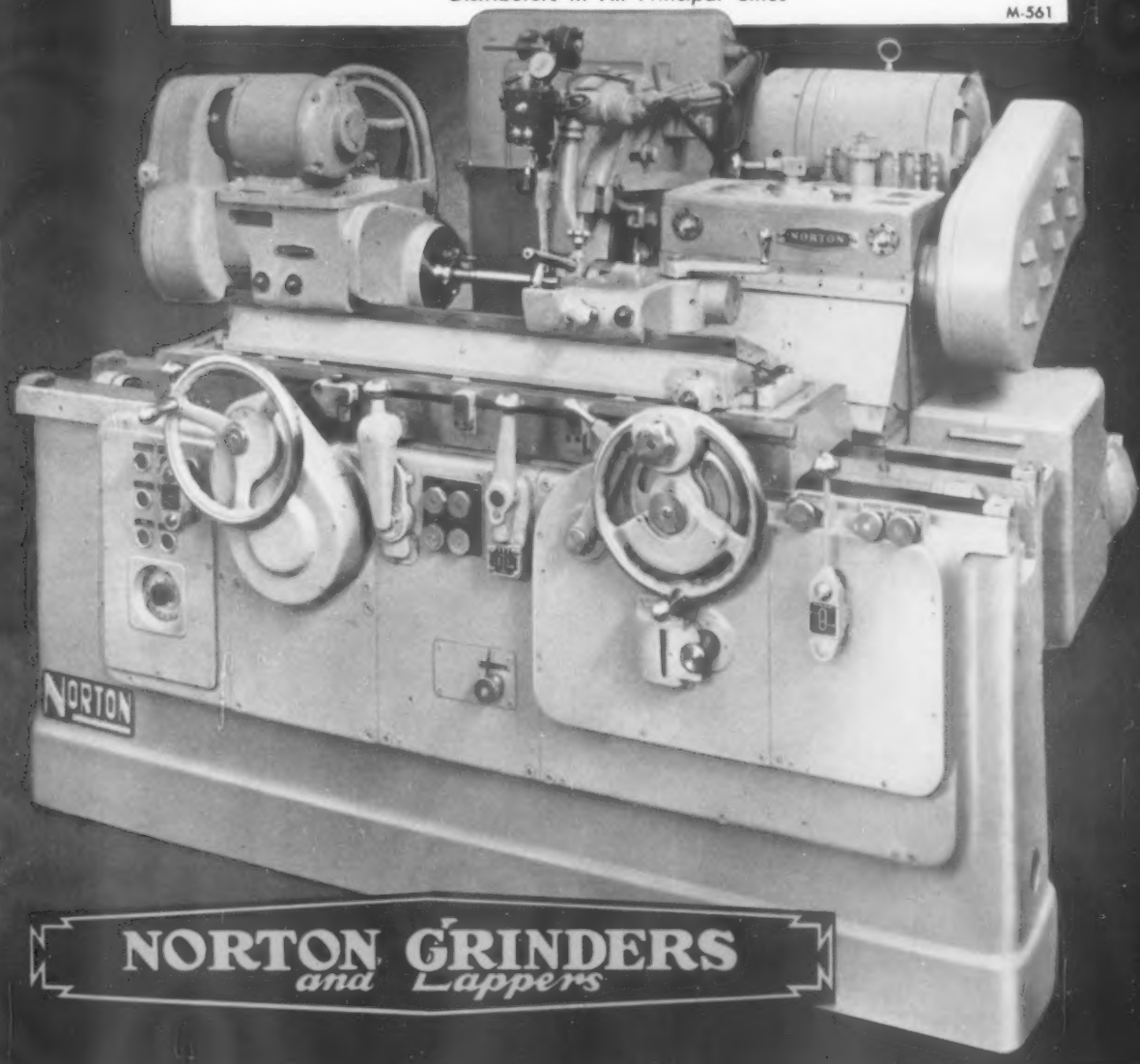

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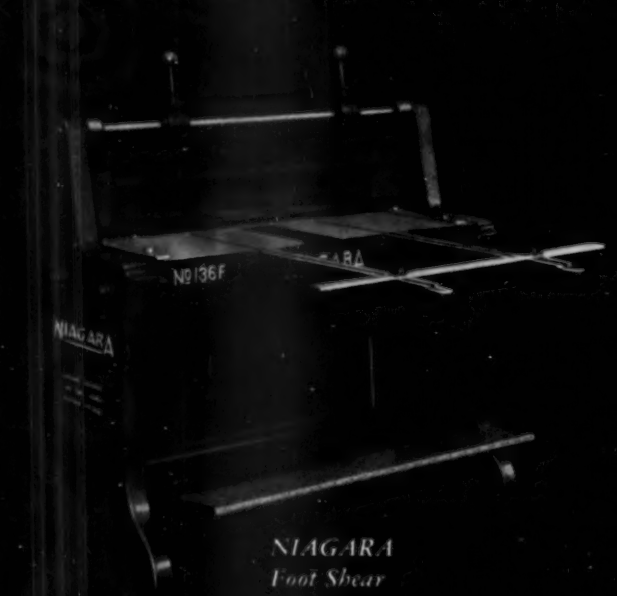

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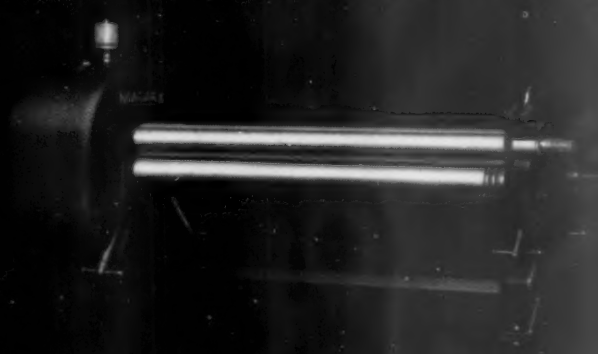

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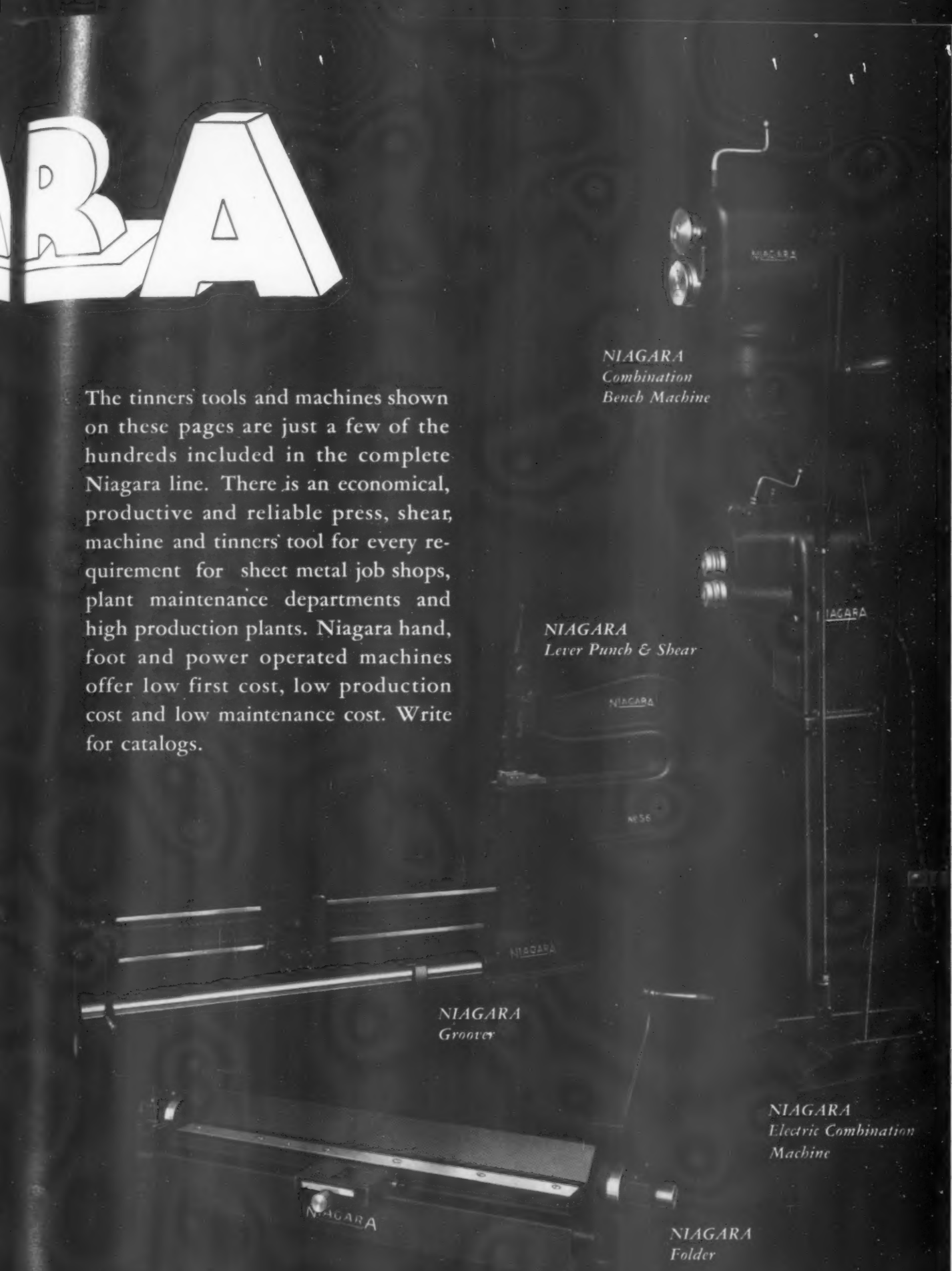

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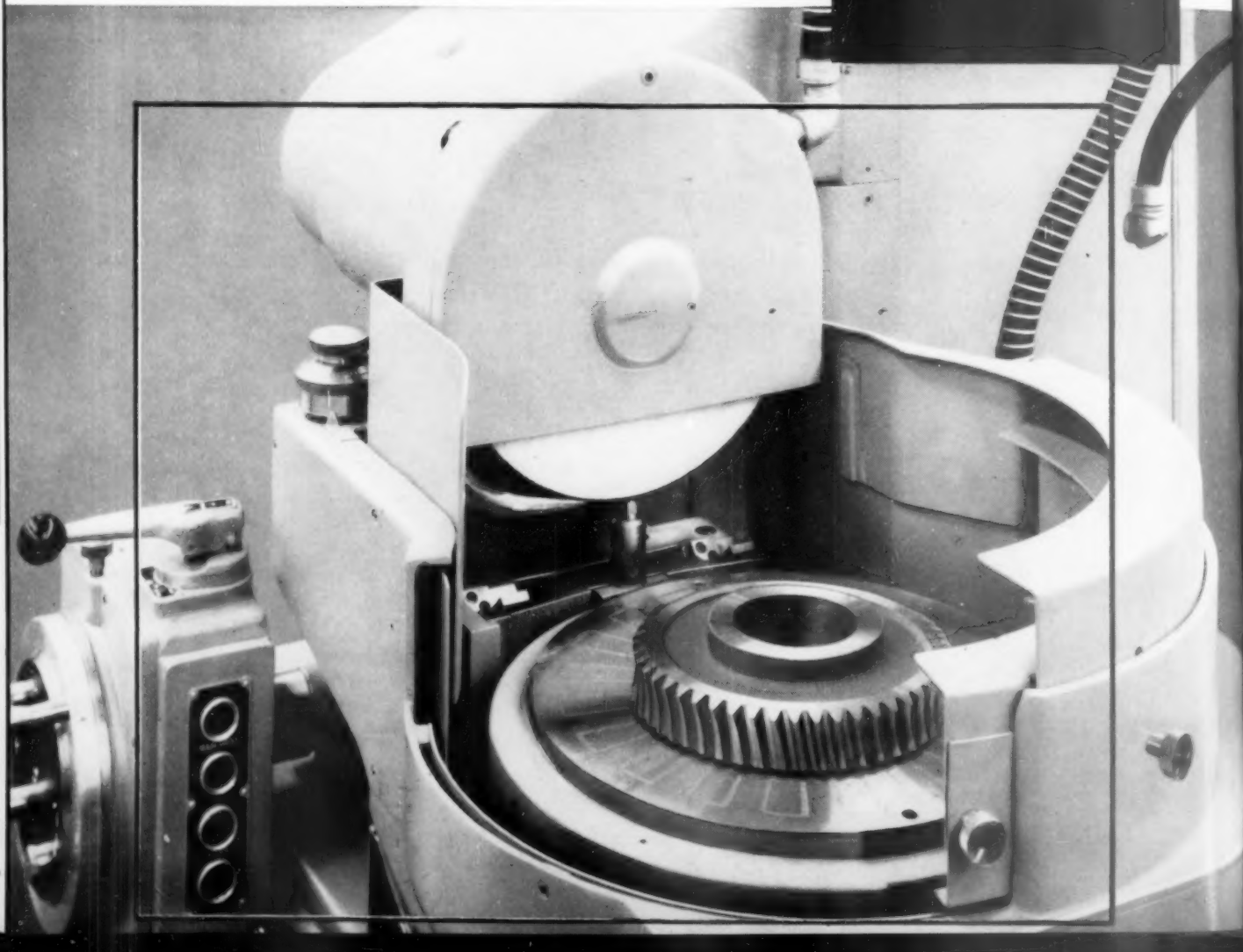

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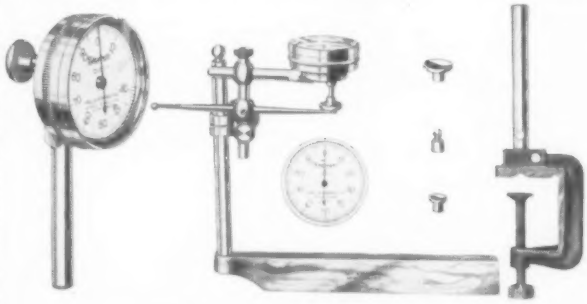

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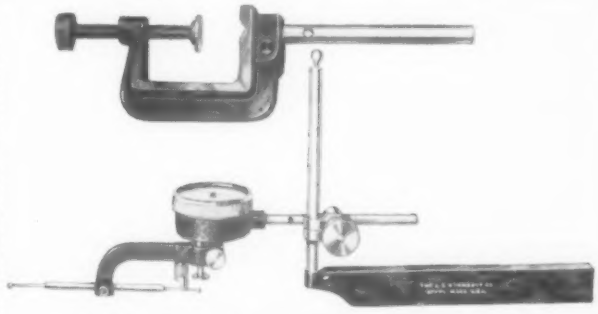

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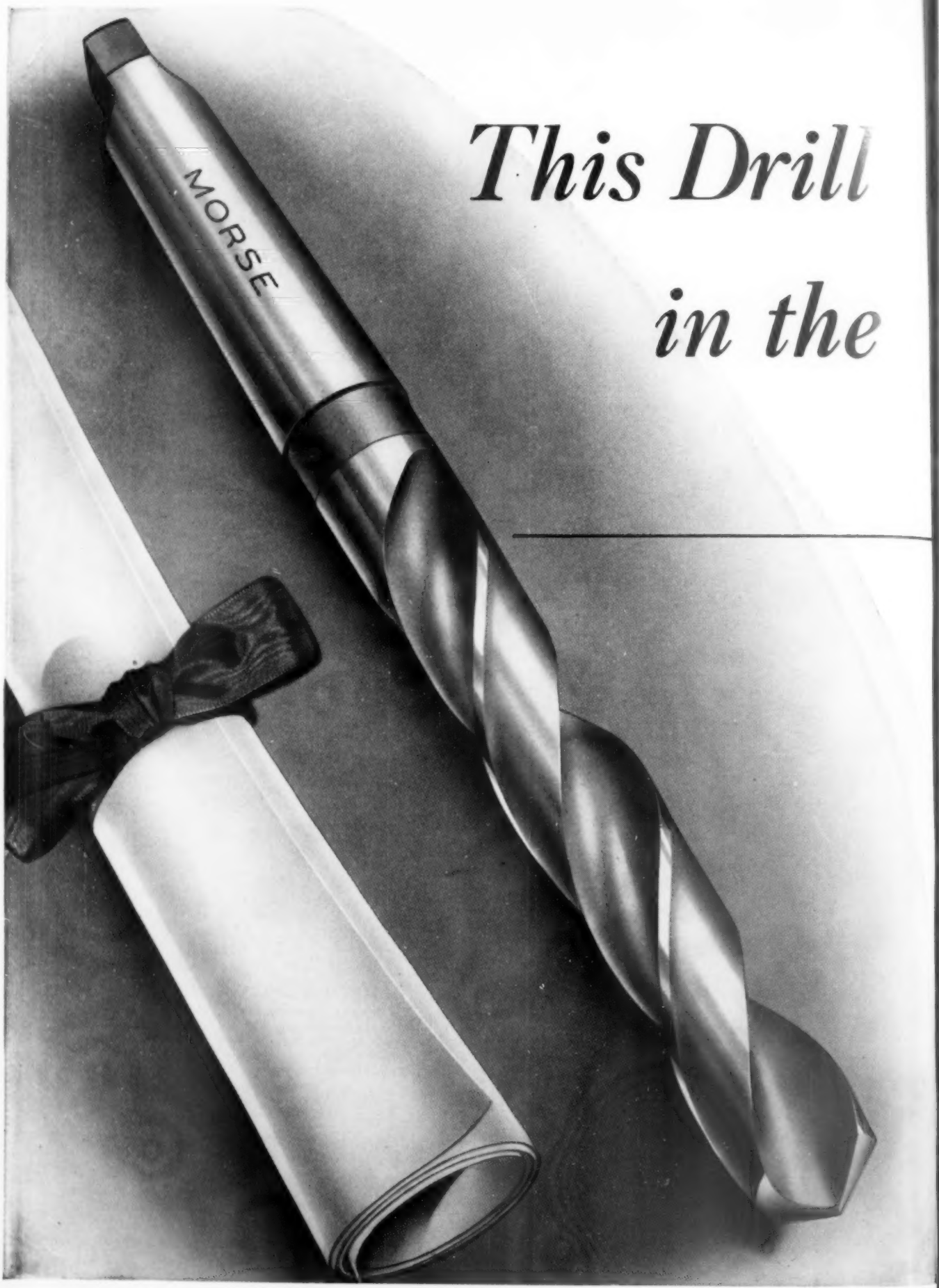

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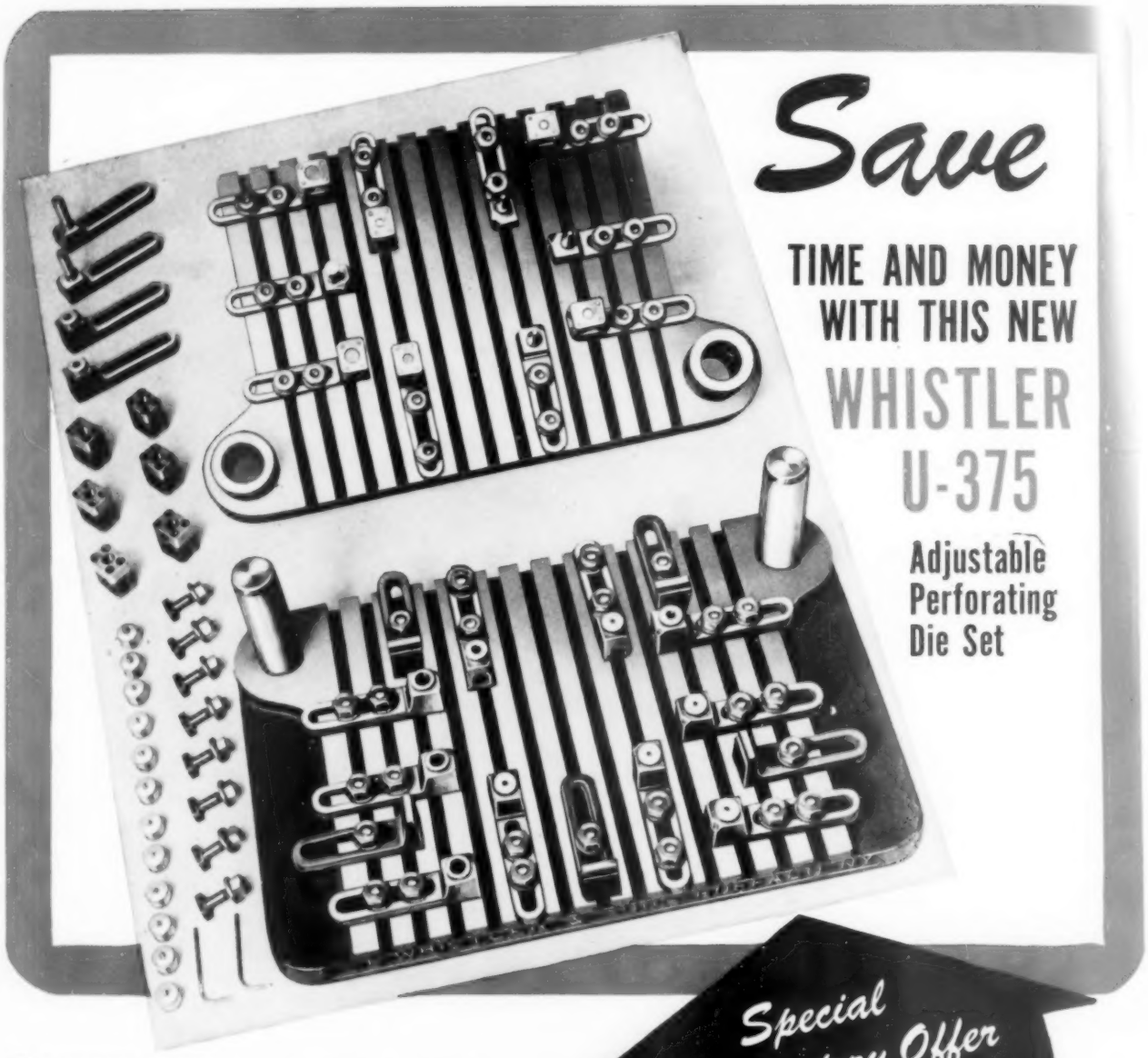

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Introduction to Aluminum Presswork*

By J. W. Lengbridge

Installment No. 1 of a Series on the Theory and Practice of Pressing Aluminum

PRESSED METAL PROCESSES include a wide variety of operations, each involving its own particular type of plastic movement. A pressing operation may involve stressing the material under conditions which will cause controlled fracture, as in shearing; stressing the material within its plastic range without fracture, as in drawing; or forcing the material into cavities, or through prearranged escape paths, as in forging, ironing, and extruding operations. The basic principles of these types of cold work are quite different, and must be understood, in order that the tooling can be planned to permit the operation to function correctly without overstressing the metal, or producing faulty work.

The component being made may require one or more of the various types of operation, in order to obtain complete shaping and sizing. Most of the operations occur at high speed, under conditions of severe friction and stress. The type of cold work being done on the metal may involve the comparatively simple operation of cutting or shallow forming, or the more complex operations of deep drawing, ironing, expanding, or multi-blow drop hammer forming.

John W. Lengbridge **entered engineering via the shop, where he gained practical experience in tooling for production. For the past 30 years with the Aluminum Company of Canada and its affiliate, the Aluminum Goods, Ltd., Toronto, Canada—where he is now Project Engineer and Chief Draftsman—he has specialized in presswork on aluminum products.**

Mr. Lengbridge is a charter member of Toronto Chapter, ASTE, where he has been active in committee work and is now Chapter chairman as well as chairman of the educational and public relations committees. He is a registered Professional Engineer, is active in sports, and a member of the Board of Governors, the Toronto Cricket Council.

The pressing equipment may range from small foot-operated presses, to huge mechanical or hydraulic machines having capacities of 1,000 tons or more and requiring a crew of men to operate the machine and to handle its products. The size of the work may range from small cups, ¼" or less in diameter, to aircraft and automobile parts large enough to require mechanical handling equipment.

Classification

The scope of draw press work may be gauged to some extent by a comparison of the two examples of deep drawing shown in Fig. 1, a large shell, made from Alcan 3SO Aluminum in 3 operations, from a 26¾" blank, and (in circle) a small tube ¼" in diameter by 2½" long, made from an AC 3SO blank 1 3/16" in diameter.

Pressing operations may be arranged into groups classified according to the type of work done on the metal as follows: (A) The drawing group, which includes such operations as: Shallow forming, including embossing; drawing; drop hammer forming; and expanding, contracting, and curling. (B) The forging group, which includes: Ironing (severe wall thickness reduction); cold forging, including coining; and extruding. (C) The cutting group, which includes: Blanking; piercing; notching; and shearing.

All of the above operations involve a consideration of metal flow, stresses, tooling, pressure, lubrication, and so on, as well as an appreciation of the limitations of the metal, in order to obtain the best results. The following brief description of these operations will explain their major differences, and their uses.

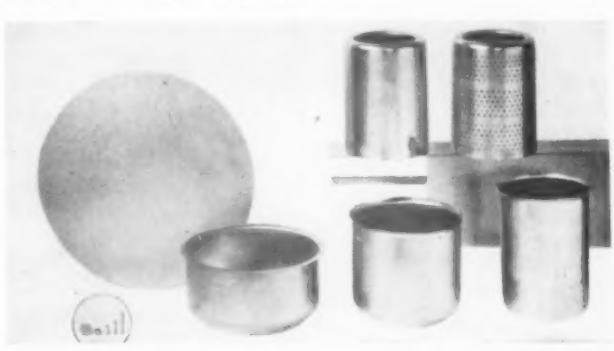
Shallow Forming, Embossing, Drawing

The purpose of a drawing operation is to change the shape of a flat metal blank into a hollow vessel without changing the thickness. In shallow forming and embossing operations, the metal movement is bending rather than drawing whereas, in deep draws, the material is often worked to the limit of its plasticity in order to obtain the maximum change of shape in each operation. Such severe cold working operations demand a much closer attention to detail than less severe draws, especially so because the flow stresses rise in proportion to the severity of the operation.

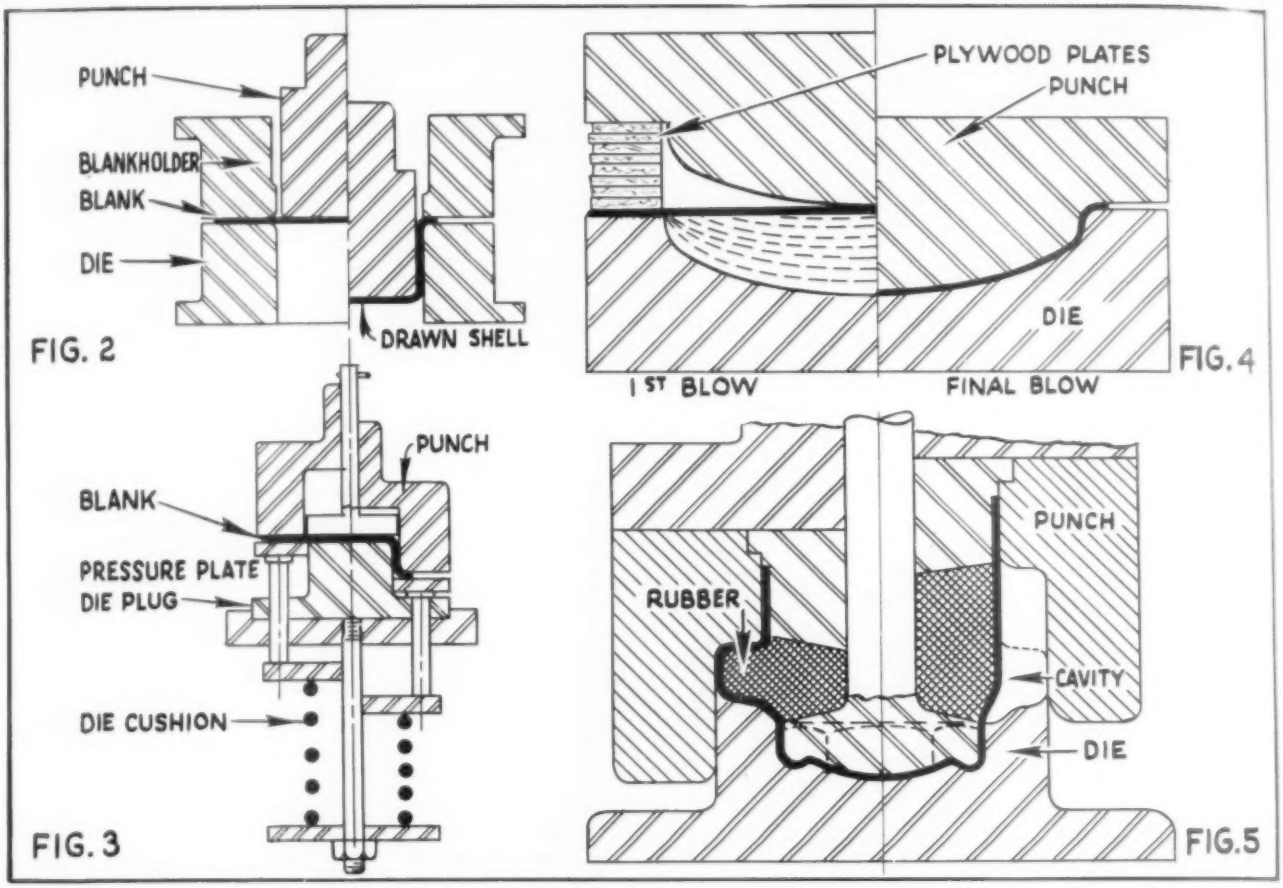
Metal may be drawn in either double-action presses, or in single-action presses, and a typical double-action press drawing operation is shown in Fig. 2. In this operation, the blank is drawn from between the upper face of the die and the lower face of the blankholder into the die cavity by the downward movement of the punch. The pressure of the blankholder on the surface of the blank prevents wrinkles being formed as the metal is moved towards the die radius.

The tendency to wrinkle is quite natural, because the circumference of the blank becomes smaller as the draw proceeds, and the control of this wrinkling tendency is an important factor in the operation. The mechanism of the press is such that the blankholder is moved to its position on the blank, before the punch is brought down, the movement of the two being synchronized to operate in correct sequence. The tool for the operation consists of three main parts—punch, die, and blankholder.

FIG. 1. Two examples of deep drawing. The perforated drum at upper right is about 10" diameter, while the small shells in the circle are reduced to about ¼" diameter × 2½" long in the final draw.



* This series of articles is a collaboration between the author, Mr. Lengbridge, and Aluminum Laboratories, Ltd., of Kingston, Ontario.



FIGS. 2 and 3 show, respectively, diagrams of double-action and single-action press drawing operations. Fig. 4 shows a drop-hammer forming operation. The plywood plates are removed, one at a time for each drop of the hammer until the final blow is struck, which finish forms the part. Fig. 5 is a diagram of an expanding operation. The rubber bulges out under ram pressure, expanding the part to the I.D. of the die cavity, and returns to original shape on the up-stroke of the ram.

A single-action press drawing operation, shown in Fig. 3, performs the same work in essentially the same way, but because the blankholding and drawing functions must be performed by one mechanical action, some differences in tool design are necessary. In this type of tool, the punch is equivalent to the die on a double-action tool, the die plug equivalent to the punch, and the pressure plate equivalent to the blankholder. The punch draws the metal over the die plug, from between the pressure faces, and the wrinkling is prevented by an upward force on the pressure plate resulting from the resistance of the die cushion to compression.

Because of the severe stress conditions under which flow must take place in drawing, much of the success of the operation depends on the properties of the metal being drawn, as well as on the correctness of the tooling, blank size, lubricant, and blankholder pressure. The careful selection of metal and the use of modern press equipment, however, are not enough to guarantee quality products. Each job must be carefully planned through all its stages or operations, and in deep draws particularly, the metal must be worked to the limit and yet not overstressed. The engineering must be sound and the tooling practical, so that the process will be capable of producing 100 or 100,000 identical parts, at high production rates with a minimum of tool adjustment and scrap loss.

The material in a drawing operation is under combined tensile and compressive stresses which cause three types of strain, namely, bending, stretching, and compressing. These three types of strain usually occur together in varying degrees, depending on the severity of the operation. A deep draw may involve limit strains of all three kinds, while a shallow draw may involve bending only.

In all true drawing operations, the flat blank must undergo a complete change of shape, with little or no change to the thickness of the metal. In other words, the area of the finished shell should be approximately the same as the blank from which it was drawn, and in a typical tool, the space between the punch and the die walls is such that the material is not pinched in this area. For this reason, the operation may be described as "Free Drawing" or "Constant Area Drawing" to distinguish it from operations in which the area is increased by reducing the metal thickness, as in press ironing operations.

Drop Hammer Forming

Drop hammer operations are quite common in aircraft plants, where the type of work covers quite a wide range of unsymmetrical shapes and sizes. Many of the components are typical drop hammer products which would be difficult to shape by any other method. Frequent modifications and changes in aircraft parts, for example, necessitate tooling which can be quickly and economically altered to comply with new developments.

Because of this, and the fact that the lot sizes are usually small, kirksite, masonite, and similar materials are used extensively for tool material. Deep shapes can be drop hammer formed, but usually require several blows, each adding a little to the depth, and performed in such a manner that the wrinkles are flattened out at each blow.

A typical drop hammer forming operation is shown in Fig. 4. The plywood plates on which the punch flange rests are about ¼" in thickness and are stacked high enough, at the beginning of the operation, to prevent the punch nose from forming more than a shallow dish in the blank. After each drop one or more plates are removed, so that a little more depth can be obtained in the subsequent blow.

This progressive forming is indicated by the dotted lines in the illustration. The metal moves into the die a little at a time, and finally assumes the shape of the punch as shown to the right of the centerline in Fig. 4. With suitable tools, however, this same shape could be obtained in one blow on a standard draw press since, with draw press equipment, it is possible to maintain better control of the metal flow by preventing wrinkle formation, as will be explained later in this article.

The nature of the equipment, and the frequent need for multi-blow operations, makes labor cost of drop hammer work higher than standard draw press work. The drop hammer, hydraulic hammer, and similar machines are well adapted to the aircraft industry, but seldom used in the average press shop. However, the process is mentioned here merely as a matter of interest, it is not proposed to discuss it further in this paper.

Expanding, Contracting, Curling

Expanding and contracting operations are usually supplementary to drawing operations in order to obtain further changes of shape which cannot be performed by drawing. Some applications of this type of forming will be discussed later, because success with these operations depends to some extent on the drawing operations. The amount of expanding or contracting, which may be done on a shell, depends on the amount of cold work which the metal has received in the preceding drawing operations. A typical expanding tool is shown in Fig. 5.

A drawn cup is placed in the die and the pressure of the punch on the rubber inside the shell causes the rubber to bulge. The rubber forces a portion of the wall of the shell into a cavity formed when the punch and the die come together. The pressure on the rubber is released when the punch moves up, and the rubber returns to its original shape.

Ironing

Operations in the forging group are more or less special processes involving quite different flow phenomena to drawing. These operations, which include ironing, cold forging and extruding, will be limited to a brief description. In a press ironing operation, the main purpose is to reduce the wall thickness of a drawn cup. This type of cold work is common in shell case plants, where brass blanks ½" or more in thickness are made into cases having a wall thickness of 1/16" or less. Severe ironing of an experimental nature has been done with some success on Alcan 65S aluminum alloy, using the tools for 40 mm brass shell cases.

This type of operation has some possibilities in the manufacture of consumer goods. Some hotelware is now made by welding a thick "base shell" to a comparatively thin "side shell," a method which involves high welding costs and results in a weakening of the shell structure because of the local annealing occurring in the operation. The same type of utensil can be made by ironing the side walls of a thick drawn shell, thus eliminating the high cost of welding and, at the same time, producing a more serviceable utensil having a thick bottom and thinner sides in which none of the work hardening effect is lost. A typical ironing operation, shown in Fig. 6, illustrates the method of reducing the wall thickness by forcing the wide wall metal through a space which is less than the thickness of the drawn shell.

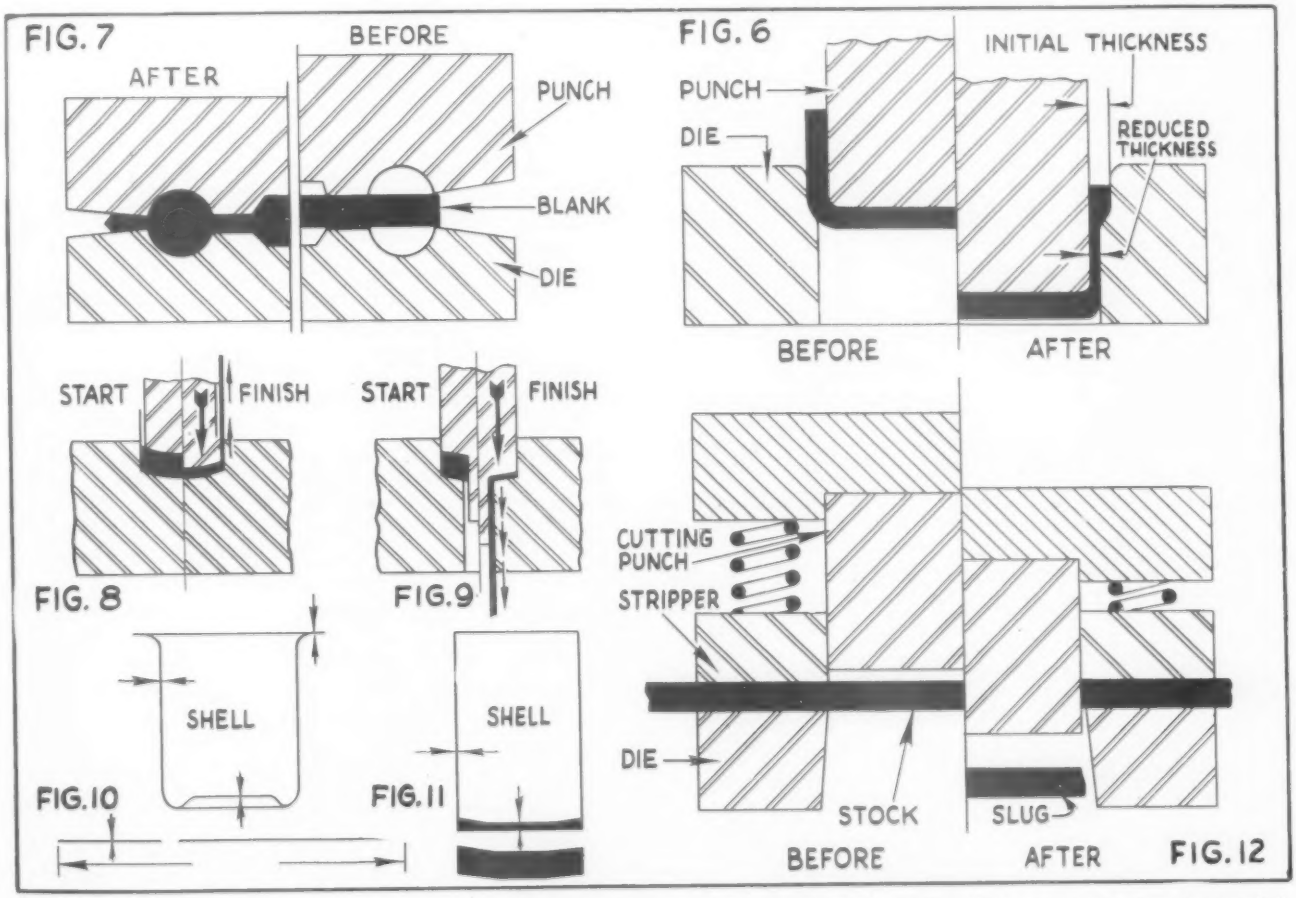


FIG. 6. Diagram of a press ironing operation, and Fig. 7, a diagram of a press forging operation. Figs. 8 and 9 show, respectively, the principles of the impact and the Hooker extrusion processes. The first is used largely for such items as collapsible tubes; the latter for extrusion of longer thin-walled tubes. Figs. 6 to 9 show "before and after" cycles. Fig. 10 shows a press-drawn shell, with blank, and Fig. 11 an extruded shell, with blank or "slug." The latter need not be disked, as shown. Fig. 12 is a diagram of a press cutting operation.

Ironing and drawing are two separate and distinct operations, and although a little drawing is usually done in an ironing operation, the diameter difference, before and after ironing, need only be sufficient to allow the ironing punch to enter the shell freely. Drawing and ironing cannot be combined in one operation if both reductions are at all severe.

In literature, ironing is often referred to as drawing, but the operations are so vastly different that applying the term "drawing" to both is misleading. In an ironing operation, surface area is increased at the expense of thickness; in a drawing operation, the surface area remains more or less constant. The terms "increased area" and "constant area" could well be made use of in naming these two operations, but in this discussion we will refer to them as "Ironing" and "Drawing."

Cold Forging, Coining

Cold forging is a squeezing operation in which the metal is made to fill up a more or less closed cavity, as illustrated in Fig. 7. This is an operation in which the punch bottoms solidly on the forging and, in order to avoid severe overloading of the equipment, some allowance must be made for the escape of excess metal. The excess—or flash, as it is called—is squeezed out as shown into a free area around the forging, and this is later trimmed off in a die. Considerable experience and experimenting is necessary, at times, to determine the correct size, shape and thickness of the blank, and it is quite often necessary to perform the blanks in order to concentrate the flow into difficult parts of the cavity. Coining operations also fall in this group.

Extruding

Extruding processes are capable of producing a wide variety of shapes and sections, some of which are competitive with press drawn shapes. Two of these methods are known as the impact extrusion process and the Hooker process. In cold forging, the material is made to fill a cavity and the excess is allowed to escape. In these extrusion processes, the material under pressure is made to escape along prearranged paths as indicated in Figs. 8 and 9. In these two diagrams, which show both processes, the escape path is indicated at "t" and this space controls the thickness of the wall in the finished product. The thickness of the slug or blank, and the working stroke of the punch, determines the depth of the extrusion, and in the impact process, the thickness of the bottom also.

The impact process shown in Fig. 11 is used to produce collapsible tubes, radio shields, condenser shells, and many other similar straight-walled products. With suitable equipment, a quite large deep shell can be extruded in fewer operations than a similar shell can be drawn, and other features such as fluted outside walls with smooth inside walls can be made by the impact process. Such features are at least difficult, if not impossible, to obtain by drawing.

The Hooker process (shown in Fig. 9) is used to produce long tubular products such as pencil tubes, thermometer cases and similar articles, and is very similar in principle to the impact process. A comparison between a press drawn cup and an extruded cup is shown in Figs. 10 and 11. Extrusion processes require special equipment and are limited to certain metals such as lead, zinc, and aluminum, whereas the drawing process using standard equipment can produce formed shapes from almost any metal which can be rolled into sheet.

Cutting

This is the simplest and most common group of pressing operations and includes such work as blanking, piercing, shearing, notching, and lancing. The object of the operation is to fracture the material along a predetermined line, making a clean cut with a minimum pressure. Since the fundamentals of cutting operations will be discussed later, little need be said here except to state that the type of cut edge obtained, and the load required to make a cut, depend almost entirely on correct tooling. A typical cutting tool is shown in Fig. 12.

Drawing

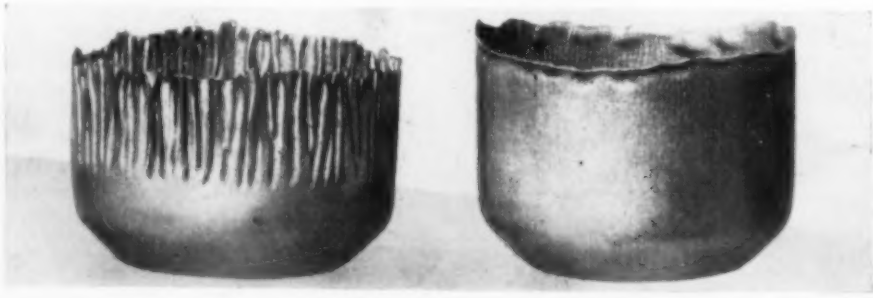
Making a hollow seamless vessel by the drawing process involves considerably more than merely pressing a piece of sheet metal into a die with a punch. Such a procedure would result in either a fractured shell or, at best, a deeply wrinkled product much inferior to the smooth walled shell obtainable under correct conditions of tooling and metal control.

This tendency of the metal to wrinkle, when free to do so, is quite natural because, in order to shape the flat blank into a cup, the circumference must be reduced. This reduction begins to take place as soon as drawing starts and, if the movement of the metal is not controlled, the crowding of the metal towards the center of the die causes it to move vertically from the face of the die in the form of radial ridges or wrinkles.

Prevention of wrinkle formation is therefore one of the main problems of the operation. The vertical movement may be prevented by applying suitable pressure on the metal in the flow area by means of a blankholder, and by making the metal flow in a direction parallel to the die face, thus making possible a smooth walled shell of reasonably uniform thickness.

Fig. 13 shows two shells made from two blanks of equal diameter and thickness, both made from the same punch and die. Shell "A" was made without using a blankholder, and no attempt was made to control the movement of the metal while it was being pulled into the die. The result is a rough deeply wrinkled shell having little use or value as a pressing. Shell "B" was drawn with a blankholder and, by applying just enough pressure on the blank to prevent wrinkle formation, the metal was made to flow in such a manner that the finished shell has comparatively smooth walls. It is deeper than shell "A" because no area is lost by wrinkles and folds, and may be considered typical of what is meant by a drawn shell.

To bring about this reshaping, the metal must be plastically worked at room temperature, and the pressure necessary to make the draw and control the flow must not exceed



Blankholders may spell the difference between success and failure in deep drawing, not only of aluminum, but of all sheet metals. For example, Fig. 13, at left, shows the result of uncontrolled flow and, at right, a shell produced with controlled flow. Both shells were made from identical blanks and both were drawn in the same die. However, the wrinkled specimen (left) was made without use of a blankholder, whereas the one at right was produced from a die provided with a blankholder. It is not only smooth but considerably deeper than its useless mate.

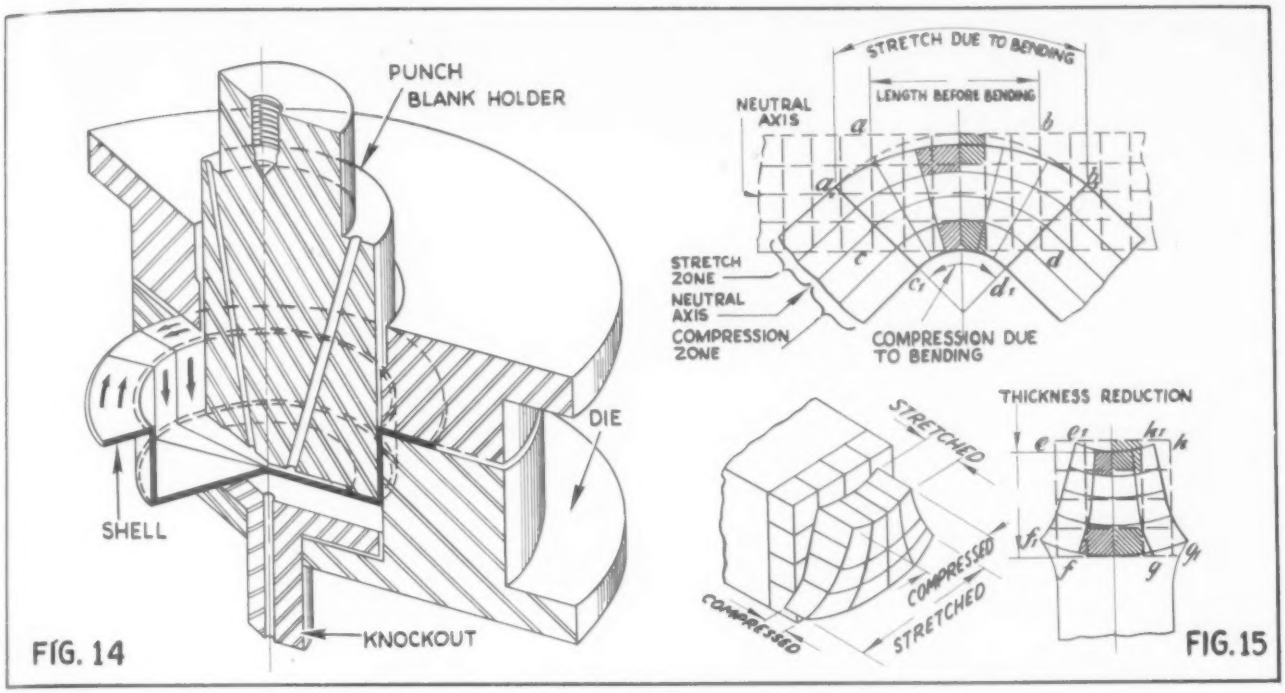


FIG. 14, at left, is a section through a draw tool, double-action press type, showing the relative positions of the tool and shell. Fig. 15, at right, is a diagram showing the flow in a bend. Stresses on the metal (indicated by arrows) are compressive in the material moving toward the die radius, and tensile in the material which has moved over the radius.

the strength of the metal. The shell must be seamless, free from wrinkles, and of approximately the same thickness as the blank from which it was drawn. The shaping of the metal may follow a fairly uniform pattern, as in circular shells, or it may be unbalanced as in irregularly shaped shells. The amount of cold work, necessary to shape any one shell, may range from several limit draws involving severe flow in each operation to one simple draw involving very little flow.

The metal must be plastic enough to take its new shape in as few operations as possible, in order to reduce both the tooling cost and operating cost. However, there are limitations, and the amount of cold work which may be done in one operation varies with the alloy, temper, thickness, and diameter of the metal to be drawn.

No two batches of metal are identical in chemical composition, crystal size, temper, plasticity, and so on, yet the pressings must be identical in form, surface finish, strength and size. The lubricant used may vary in quality and quantity, and tools may become roughened by abrasion; yet, in spite of metal and tool variables, flow stresses, and the severe friction conditions existing in the operation, the metal must flow freely without weakening at point of severe stress, without wrinkling, and without surface marking.

The tools in which the work is done consist principally of three main parts: a "punch" which actuates the metal movement, a "die" into which the metal is moved, and a "blankholder" which controls the movement or flow of the metal and prevents the formation of wrinkles. It should be noted here that the foregoing names apply to double-action draw tools only. Single-action tools consist of parts performing the same functions, but long established press room custom describes them by different names, as shown below and as indicated in Figs. 2 and 3.

Double-Action Tools	Single-Action Tools
Punch; Die; Blankholder	Die Plug: Punch; Pressure Ring

A typical double-action drawing operation, illustrated in Fig. 14, shows the tool and the shell in section to indicate their relative positions. The direction of the stresses on the metal during the operation is indicated by arrows on the shell. These stresses are compressive in the material moving towards the die radius, and tensile in the material which has moved over this radius. The space between the punch and die walls must be slightly more than the thickness of the metal being drawn, so that there will be no wall friction in this area with its tendency to retard flow.

The pressure applied by the blankholder on the flange metal must be sufficient to prevent wrinkle formation, but not enough to retard or prevent flow. An understanding of flow phenomena, discussed in the following sections, is the first essential to an appreciation of the severe cold work necessary in a drawing operation to obtain a maximum change in shape.

Flow (straightline and in bends)

The change in the shape of any piece of metal, which is drawn into a die, is brought about by making the metal flow on a plane parallel to the die face and in such a manner that its thickness and surface area remain approximately the same. The punch pressing on the center area of the blank actuates this flow, and the blankholder pressing lightly on the outer area controls the direction of the flow.

The term flow, used to describe the metal movement in a drawing operation, may be defined as: "The reshaping and rearranging of imaginary units of area (into which the blank is divided) which is necessary in order to change a flat blank into a hollow seamless vessel." When this flow occurs under proper control, and in correctly designed tools, the results will be a wrinkle-free shell having approximately the same surface area and thickness as the blank from which it was drawn.

These units of area are moved under some control into new positions, and at the same time changed in shape and amount proportional to the change in position. Units located in the central area of the blank will move and change but little, whereas the units located on the outer edge of the blank will undergo maximum change in shape and position.

The flow in each individual area unit contributes to a general change in the shape of the entire blank, and the size

and shape of the shell can be predicted from a study of the size and shape of the blank, unless some variable in the metal or the tooling prevents or retards normal flow. A study of metal flow in a drawing operation will show that the metal is subjected to combined compressive, tensile, and bending stresses which increase with the severity of the flow.

The flow occurring as a result of a bending operation is not as restrained or as general as the flow occurring as a result of a drawing operation. The metal is free to move away from the bend radius block, and metal movement is confined to the region of the bend. Because bending or flexing of the metal is one of the stresses in a drawing operation, this type of flow should be discussed in connection with drawing.

In a bending operation, no metal movement occurs except that which takes place in the actual bend zone, and adjacent to it. Maximum flow will take place through the center of the bend radius, and drop to zero in the area just outside the actual bend zone. The direction of the flow on one side of the neutral axis is opposite to the direction of the flow occurring on the other side. The neutral axis is a plane running approximately half way between the inner and outer radii of the bend.

In Fig. 15, diagram A shows a bend superimposed on its original form to illustrate the change in shape and position of the marked area units. The bend zone is confined within the rectangle a, b, c and d in view A, and e, f, g and h in view B. The metal in this zone will involve maximum flow as a result of bending; and the only flow in the adjacent metal will be where the change of shape in the bend zone blends into the original shape of the bend sample.

After bending, the bend zone is confined between the inner and outer radii, the two radial lines a_1-c_1 and b_1-d_1, in view A, and the area e_1, f_1, g_1 and h_1 in view B. Diagram C shows an isometric view of a group of units on a section through the bend, before and after bending, to illustrate the magnitude of the change in shape and the direction of the metal movement in different parts of the section.

If a metal bar of individual cubes could be made like those in view C, and held together while the bending took place, one would find that a change would occur in the length, width, and thickness of each cube. This change would be most severe on the center of the bend radius. There would be an increase in length, and a decrease in thickness and width in the cubes outside the neutral axis; with a decrease in thickness, and an increase in width in the cubes located inside the neutral axis.

The general result of these changes would be a reduction in thickness through the center of the bend, a bulging at the inner bend radius, and a thinning at the outer bend radius. The reduction of thickness, characteristic in a bend, also occurs in a draw, when the punch or the die radii are made too sharp, and this often causes fracture through the weakened area.

Fig. 16 shows several views of an actual bend over a $\frac{1}{2}$" radius, on a piece of soft aluminum bar, 1" × 1" × 7$\frac{1}{2}$" long. Each face was scribed into $\frac{1}{8}$" square area units before bending, and the change in the shape of these squares, on the three views of the bend, indicates the direction and the amount of the movement on three faces of the bar.

View A shows the marked bar before bending. View B shows a front view after bending, and views C and D show the inner and outer faces of the bend respectively. The marked units of area on each view show the change in shape of the $\frac{1}{8}$" squares on each face of the bar. The flow that occurred in this bend occurs in any bend in a greater or lesser degree, depending on the radius of the bend and the thickness and temper of the metal. This experiment suggests that a bending operation on a piece of metal has the following characteristics:

1. The thickness of the metal through the bend may be reduced if the bend is sharp. 2. The length of the fibres outside the neutral axis is increased. 3. The length of the fibres inside the neutral axis is compressed. 4. Because the cubic area of the metal in the bend zone remains the same, the stretching (2) is accompanied by a reduction in width, and the compressing (3) is accompanied by an increase in width. This results in a shortening of width in the outer fibres and an increase in width (bulging) in the inner fibres.

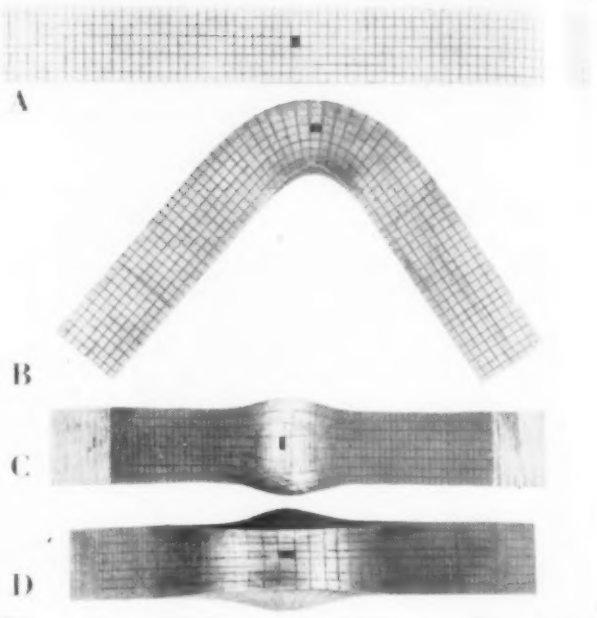


FIG. 16 shows several views of an actual bend on a piece of aluminum bar, 1" × 1" × 7½" long. Each face was scribed into ⅛" squares before bending to a radius of ½". A, the marked bar before bending; B, front view after bending; C and D, the inner and outer faces of the bend, respectively. Changes in the shape of the ⅛" squares show stretch and compression of the metal fibres.

The dimensional changes which occurred in this experiment are as follows:

	BEFORE BENDING	AFTER BENDING
1. Change in thickness measured through the vertical center line, (View B)	1"	15/16"
2. Length of outside fibres	1⅜"	2-1/16" maximum stretch
3. Length of inside fibres	1⅜"	13/16" maximum reduction
4. Narrowing of width, outer bend radius (View D)	1"	¾"
5. Increase in width, inner bend radius (View C)	1"	1⅜"
6. Size of one unit on inner bend radius (View C)	⅛" × ⅛"	Lateral increase Longitudinal decrease
7. Size of one unit on outer bend radius (View D)	⅛" × ⅛"	Lateral decrease Longitudinal increase

END OF INSTALLMENT NO. 1, this Series. Part 2 will follow in July, The Tool Engineer.

By **Emil Kuhn**

Cutting and Fragmentation Formulae

A Review of the Results of Studies made by the Author and other Contemporary Investigators

CREDIT SHOULD BE GIVEN to Fred W. Taylor for the discovery of the important role played in the workshop by the choice of the cutting speed, in relation to the feed and the cutting depth. Since this discovery, numerous experiments have been conducted aiming at the determination of the most favorable cutting speeds which eventually led to tool life speeds.

But the problem of the cutting pressure, in spite of all research, has not yet been conclusively solved. Von Klopstock's exhaustive experiments, conducted with straight edged cutters, led to the final result that the ratio of the cutting depth to the feed is only of slight influence upon the cutting pressure. The values obtained by this investigator were found to be:

for wrought iron, $P = 229\ (f)^{0.842}$ kg
for soft cast iron, $P = 95.5\ (f)^{0.865}$ kg
for chrome-nickel steel, $P = 367\ (f)^{0.802}$ kg

Emil Kuhn **was graduated from the Eidgenossische Technische Hochschule in Zurich, in 1904, and for the next ten years engaged in engineering in the Orient. Subsequently recalled to Germany, he was employed by the Linde Liquid Air Company for about four years, later becoming Technical Consultant for Maschinenfabrik Oerlikon and Escher Wyss & Co., in Zurich.**

At present, he is retained as Consulting and Research Engineer by several leading Swiss engineering concerns. An authority in the field of cutting and fragmentation, on which he has conducted considerable original research work, he occasionally lectures on these subjects in Zurich.

The Law of Cutting Pressure

The law of cutting pressure may be formulated as:

$$(1) \ldots\ldots P = (p_1)\,(f)^y$$

Note that p_1 and y are characteristic for each specific material to be worked.

Taylor regarded experiments on cutting pressure as worthless because they were leading to a variety of inconsistent results and formulae, as shown by other contemporary investigators (Nicholson, Ripper, and Friedrich included). In the end, it appeared that all experiments conducted with various p_1 and y could be reduced into a unified form. The writer, while at the Maschinenfabrik Oerlikon in 1924 and 1925, was able to recalculate all the experimental work done in terms of the relationship expressed in equation (1).

A similar approach to this investigation was made by Dr. (Ing.) Kronenberg in his theory of fragmentation. He arrived at the same conclusion; however, his law of cutting pressure does not express the variation of the main cutting pressure P but represents the variation of the specific cutting pressure, viz.

$$(2) \ldots\ldots k_s = \frac{C_{k_s}}{\sqrt[\varepsilon_{k_s}]{f}}$$

Kronenberg's formula expresses basically the same relationship, as shown from the following derivation:

DIRECTORY OF SYMBOLS USED IN FORMULAE ON CUTTING

P = Main cutting pressure in kg (kilograms)
p_1 = Cutting pressure for 1 mm² chip offtake
f = Chip section in mm² **
k_s = Specific cutting pressure
C_{k_s} = Cutting pressure for 1 mm² chip section
ε_{k_s} = Root exponent which may be calculated from y
s = Feed*
t = Cutting depth
x = Power exponent varying according to the material used
y = Power exponent varying according to the material used
H = Brinell hardness of the material used
v = cutting speed in m/min (meters per minute)
V_1 = Cutting speed for 1 mm² chip section
V_{60} = Cutting speed for 60 minutes tool life in m/min
C_v = Cutting speed for 1 mm² chip section
ε_v = Root exponent
N_w = Effect at the tool in HP (horsepower)
S_L = Chip output, in cm³/min
σ_B = Tensile strength of the material in kg/mm²
ß = Lip angle of turning tool in 360° division
k = Entering angle

* s has a different equivalent for drilling or milling than for lathe work. See later directory of symbols.

** To be interpreted as "chip cross-section in square millimeters".

*** Cm^3 to be interpreted as "cubic centimeters".

$$k_s = \frac{P}{f} = \frac{(p_1)\,(f)^y}{f} = \frac{p_1}{f^{1-y}} = \frac{p_1}{\sqrt[\frac{1}{1-y}]{f}} = \frac{C_{k_s}}{\sqrt[\varepsilon_{k_s}]{f}}$$

Therefore, Kronenberg's $C_{k_s} = p_1$

and $\varepsilon_{k_s} = \frac{1}{1-y}$

Tool Life

In lathe work, the length of time in minutes to produce a dulling of the tool is known as tool life. For economic reasons, these time elements have been set down. Taylor assumed a normal tool life of 20 minutes, whereas in this study

for high speed steel, 60 and 120 minutes
for cemented carbide, 240 and 480 minutes

are considered economic norms.

As the tool life depends upon the choice of the cutting speed, the *tool life speed* is defined as the cutting speed which is necessary to produce a tool life of 60, 120 or 240 minutes. The tool life is designated as an index of the tool life. Thus,

V_{60} means a cutting speed in which the tool lasts 60 min.

V_{240} means a cutting speed in which the tool lasts 240 min. without regrinding.

Note that the word speed is not to be confused with the term speed of the dimension distance/time, but as a function of the chip section (f). For a given material, tool type, and workmanship, the following relation holds:

$$\frac{\text{constant}}{f^x}$$

because, for every given chip section, there corresponds a certain cutting speed.

LATHE TURNING

Main Cutting Pressure

The law of cutting pressure, equation (1), yields by calculation (using high cutting speeds, a cemented carbide tool, and the same power at the turning tool) a 15 to 20% smaller chip output in cm^3/min, whereas in the workshop a 25% larger chip output is obtained as compared with the use of lower cutting speeds and a high speed steel tool. Already Leyensetter has proved experimentally that the cutting pressure varies with the cutting speed, but he failed to formulate the relationship. On the basis of these experiments, the writer has been able to establish the following relationship:

$$(3) \ldots\ldots P = \frac{400\,(f)^{0.9}}{v^{0.15}}$$

for chrome-nickel steel, where v represents the cutting speed in m/min. The table to the right gives the experimental results, with calculated values also shown for comparison:

CUTTING PRESSURES FOR CHROME-NICKEL STEEL

Cutting depth t = 0.2 mm—feed s = 0.43 mm

Cutting speed in m/min	Cutting pressure P (Experimental)	Cutting pressure P (Calculated)
12	29.0	30.1
25	27.6	27.2
50	24.7	24.5
75	22.9	23.0
100	21.9	22.0
125	21.6	21.5

A further proof of the relation of cutting pressure to the cutting speed was offered by E. von Burg in his work on aluminum and aluminum alloys.

In view of the fact that the mathematical evaluation of those experiments was missing, I undertook to formulate the mathematical-physical relationships shown in Table I which conform very closely with the results obtained under experimental conditions.

Moreover, the author has learned at the Technological Institute in Zurich that in 1944 or 1945 experiments conducted in the United States proved the dependence of the cutting pressure upon the cutting speed.

In the absence of adequate experiments, the writer has availed himself, therefore, of the *extended law of cutting pressure*, introducing the cutting speed as a variable, in order to elucidate the aforementioned contradiction of an increased chip output in actual practice in the shaping of steel with cemented carbide. The following relations illustrate the more generalized formula for all kinds of steel:

$$(4) \ldots\ldots P = \frac{106\,[\,(0.1)\,(\sigma_B)\,]^{0.2}\,[\,(0.1)\,(\beta)\,]^{0.5}}{v^{0.2}}\,(f)^{0.9}$$

in which β = lip angle of turning tool in 360° division, since the free angle does not change appreciably and therefore a negative chip angle may even be considered.

Table I. EXTENDED LAW OF CUTTING PRESSURE

Variation of the main cutting pressure with the chip section and the cutting speed for aluminum and aluminum alloys

Alloy	Average main cutting pressure			
	Condition soft on delivery		Hardened condition	
Pure Al 99.3%	$P = \frac{82 \times f^{0.82}}{V^{0.1}}$	V-100; $P = 52 \times f^{0.8}$ V-700; $P = 44.5 \times f^{0.83}$		
Al and 5% Cu	$P = \frac{86 \times f^{0.75}}{V^{0.1}}$	V-100; $P = 57.5 \times f^{0.67}$ V-700; $P = 44.5 \times f^{0.82}$	$P = \frac{94 \times f^{0.8}}{V^{0.115}}$	V-100; $P = 55 \times f^{0.7}$ V-700; $P = 45 \times f^{0.82}$
Al and 10% Cu	$P = \frac{81 \times f^{0.77}}{V^{0.1}}$	V-100; $P = 51 \times f^{0.75}$ V-700; $P = 44 \times f^{0.8}$	$P = \frac{92 \times f^{0.82}}{V^{0.115}}$	V-100; $P = 53 \times f^{0.8}$ V-700; $P = 46 \times f^{0.82}$
Anticorodal Cast	$P = \frac{80 \times f^{0.81}}{V^{0.1}}$	V-100; $P = 54 \times f^{0.8}$ V-700; $P = 42 \times f^{0.83}$	$P = \frac{94 \times f^{0.84}}{V^{0.1}}$	V-100; $P = 56 \times f^{0.82}$ V-700; $P = 48 \times f^{0.84}$
Anticorodal Press	$P = \frac{97 \times f^{0.77}}{V^{0.11}}$	V-100; $P = 59.5 \times f^{0.73}$ V-700; $P = 48 \times f^{0.82}$	$P = \frac{115 \times f^{0.78}}{V^{0.13}}$	V-100; $P = 62.5 \times f^{0.73}$ V-700; $P = 49.5 \times f^{0.8}$
Avional DTi Cast	$P = \frac{101 \times f^{0.78}}{V^{0.1}}$	V-100; $P = 63 \times f^{0.7}$ V-500; $P = 53.5 \times f^{0.78}$	$P = \frac{130 \times f^{0.83}}{V^{0.13}}$	V-100; $P = 71 \times f^{0.81}$ V-500; $P = 57 \times f^{0.84}$
Avional S Cast	$P = \frac{110 \times f^{0.82}}{V^{0.14}}$	V-100; $P = 57.5 \times f^{0.81}$ V-500; $P = 45.5 \times f^{0.83}$	$P = \frac{122 \times f^{0.78}}{V^{0.13}}$	V-100; $P = 66 \times f^{0.77}$ V-500; $P = 55 \times f^{0.81}$
Avional S Press	$P = \frac{85 \times f^{0.8}}{V^{0.07}}$	V-100; $P = 64 \times f^{0.76}$ V-500; $P = 55 \times f^{0.8}$	$P = \frac{129 \times f^{0.84}}{V^{0.1}}$	V-100; $P = 85 \times f^{0.84}$ V-500; $P = 69 \times f^{0.84}$

Symbols: P = Main cutting pressure in kg; V = Cutting speed in m/min; f = Chip section in sq/mm = depth of chip cut x feed.

The relation of cutting depth and feed has not been taken into consideration, since it is of no bearing with the domestically used straight edge cutter as opposed to the curved shapes employed by Taylor.

The derivation of this formula has been omitted since it is lengthy and involves perusal of the entire literature.

Cutting Speed (High speed steel tool)

On the basis of experiments on tool life conducted by the A.W.F. (Ausschuss für Wirtschaft und Fertigung), the writer set down as early as 1925 the following formula:

$$(5) \ldots\ldots V_{60} = \frac{V_1}{f^x}$$

where x = power exponent varying according to the material used and ranging from 0.27 to 0.66. This value has been calculated for the individual steel varieties, cast iron, brass, red brass, copper, and aluminum and by using a turning tool of 16 W.

The obtained values were found to be in fairly close agreement with those calculated according to Kronenberg's:

$$(6) \ldots\ldots V_{60} = \frac{C_v}{\sqrt[\varepsilon_v]{f}}$$

But in 1940 the above formula for *steel and cast steel* as well as for cast iron was changed on the basis of the "Aachener Calculation Tables" as published by Wallichs-Dabringhaus. The changed formula was adapted for a tool without cooling of the composition of 18% tungsten, 2.5% cobalt, 1.6% vanadium and reads:

for *steel and cast steel*,

$$(7) \ldots\ldots V_{60} = \frac{310\ (t/s)^{0.125}}{[\,(0.1)\ (\sigma_B)\,]^{1.25}\ (f)^{0.33}}$$

for *cast iron*,

$$(8) \ldots\ldots V_{60} = \frac{3300\ (t/s)^{0.1}}{[(0.1)\ (H)]^{1.7}\ \ (f)^{0.3}}$$

where t/s = ratio of cutting depth (t) to feed (s)

Both formulae hold true for chip sections (f) up to 25 mm². By changing the constants 310 and 3300, it is possible to calculate the tool life speeds for twice the tool life and speeds of other alloyed high speed steels.

Cutting Speed (Cemented carbide tools. Widia XX)

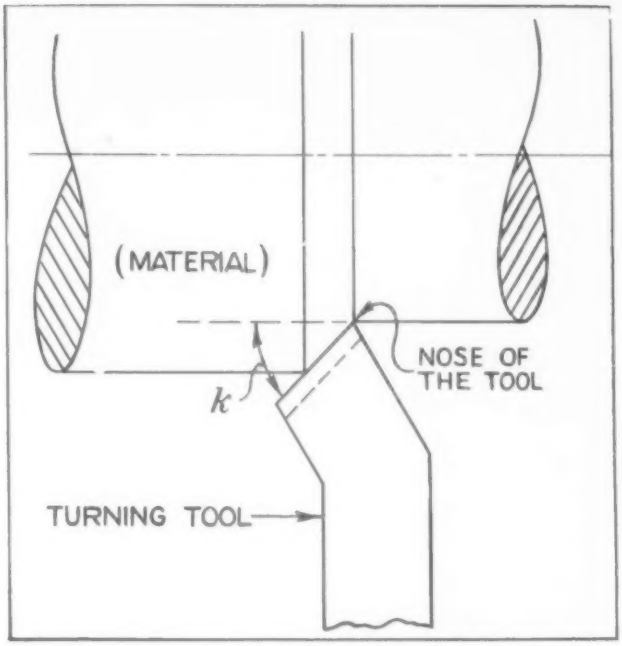
From the experiments recorded in the A.W.F., a generally applicable formula for cutting steel has been derived which assumes a tool life of 480 minutes, an entering angle of 45 degrees and a tool nose radius of r = 1 mm:

$$(9) \ldots\ldots V_{480} = \frac{1250\ (t/s)^{0.1}}{[\,(0.1)\ (\sigma_B)\,]^{1.25}\ (f)^{0.16}}$$

The deviation from the A.W.F. values amounts to maximally plus or minus 2%. Any change in the entering angle or radius of the tool nose results in a change in the constant 1250 by a few per cent. If the constant is increased to 1400, the tool life will be 240 minutes, and a decrease of the constant to 1100 will double the tool life to 960 minutes.

Chip Output

The chip output, measured in cm³/min, is represented by the product of the cutting speed in m/min and the chip section in mm². As the chip offtake progresses, the chip output at the tool corresponds to a mechanical equivalent expressed in horsepower or kilowatts. Based on this reasoning, the new cutting pressure formula has been set up and the relation between chip output (S_L) and the effect at the tool (N_W) in horsepower has been determined for the shaping of steel without cooling:



Definition of entering angle (K)

with *high speed steel* (18% tungsten, 2.5% cobalt, and 1.6% vanadium),

$$(10)^* \ldots S_L = \frac{55.5}{\sqrt{(0.1)\ (\sigma_B)}} (N_W)^{1.08}$$

with *cemented carbide* (Widia XX),

$$(11)^* \ldots S_L = \frac{68.6}{\sqrt{(0.1)\ (\sigma_B)}} (N_W)^{1.08}$$

assuming an average condition of

$$(12) \ldots\ldots \frac{t}{s} = \frac{\text{depth of chip cut}}{\text{feed}} = 8$$

for the aforementioned cutting pressure formula and a tool life speed of V_{60} for h.s.s. and V_{480} for cemented carbide.

In setting up machine card indices with their output diagrams, these formulae, being better adapted to actual practice, permit a variation of the tool efficiency curve for high speed steel and cemented carbide tools used under dry or wet conditions.

It should also be mentioned that the results obtained show a fairly good agreement with those published in the REFA-SHEETS referable to the shaping of steel with high speed tools (recalculated to a tool of 16 to 18 W). But for cemented carbide such as Widia XX, greater discrepancies are encountered, and this is due—aside from considering the cutting speed in the cutting pressure—to the fact that the REFA-SHEETS are based on the use of Stelit and Akrit tools (with about double the cutting speeds of h.s.s.).

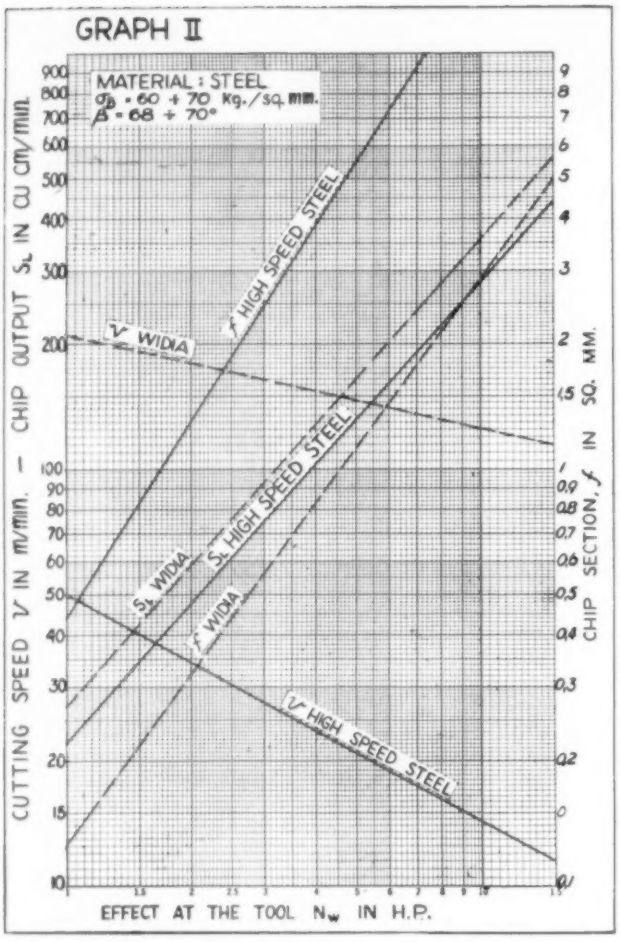
The adopted formulae for tool life speeds and cutting pressures showed, under specified conditions, the relationships:

1. For the chip section (f), using

high-speed steel (18% tungsten, 2.5% cobalt, and 1.6% vanadium),

$$(13)^* \ldots f = 0.058\ [\,(0.1)\ (\sigma_B)\,]^{1.08}\ (N_W)^{1.59}$$

* These formulae have been calculated by graphic means on a double logarithmic co-ordinate system in contrast to subsequent corresponding formulae which have been derived by purely mathematical calculations. For practical purposes, however, the resulting small discrepancies are of no significance.



tungsten carbide (Widia XX),

(14)* . . . $f = 0.0238[(0.1)(\sigma_B)]^{0.89}(N_W)^{1.3}$

2. For the tool life speeds, using

high speed steel,

(15)* . . . $V_{60} = \frac{1000}{[(0.1)(\sigma_B)]^{1.6}(N_W)^{0.52}}$

tungsten carbide (Widia XX),

(16)* . . . $V_{480} = \frac{2940}{[(0.1)(\sigma_B)]^{1.4}(N_W)^{0.22}}$

It is now possible to diagram (see Graph II) any variety of steel with tensile strength ranging from 60 to 70 kg/mm². The desired quantities (chip sections and so on) may be directly read off by drawing a perpendicular at Nw.

It is possible, instead of the Nw, to insert the machine number directly into the diagram, permitting an excellent survey of the entire machine tool equipment.

In labile or semilabile fixations, one has to start out with the permissible chip section. The remaining quantities may be determined directly from the diagram.

As an example, a series of equations for the setup of lathe charts in the shaping of steel with Cemented Carbide S_1 is offered.

First of all, cutting pressure formula (4), when applied to customary cutting angles for cemented carbide, assumes the following simplified form:

(17) . . . . $P = \frac{232[(0.1)(\sigma_B)]^{0.3}}{v^{0.2}}(f)^{0.9}$

inasmuch as the lip angle increases in direct proportion with the hardness of the material, viz. with its tensile strength.

Furthermore, owing to unavoidable fluctuations in the tensile strength of materials, it would appear more accurate to increase the cutting pressure by approximately 8%.

(18) . . . . $P = \frac{250(0.1)(\sigma_B)^{0.3}}{v^{0.2}}(f)^{0.9}$

The cutting speeds which are applicable to cemented carbide S_1 were tried out for the various chip sections in terms of the ratio of cutting depth (t) to feed (s) and their values for a tool life speed of V_{240} were found to range as shown:

Steel	σ_B in kg/mm²	Roughening cut V in m/min	Finishing cut V in m/min
Steel, soft	30 to 60	80 to 160	180 to 350
Steel, medium	60 to 75	70 to 130	120 to 170
Steel, hard	over 75	60 to 90	80 to 150

From the table it can be readily seen that the cutting speeds are about 20% smaller as compared with those for cemented carbide Widia XX, for a tool life speed of V_{480}. It is therefore necessary to decrease the constant of equation (9) from 1250 to 1050. Moreover, the chip section, in view of the lower cutting speed, may now be increased from $f^{0.16}$ to $f^{0.2}$ (Note: In equation (7), this value for high speed steel was taken as $f^{0.33}$.)

The tool life speed for cemented carbide S_1 is thus

(19) . . . . $V_{240} = \frac{1050(t/s)^{0.1}}{[(0.1)(\sigma_B)]^{1.25}(f)^{0.2}}$

From the formulae for P and V_{240}:

(20) . . . . $N_W = \frac{PV_{240}}{60 \times 75} = \frac{14.56(t/s)^{0.08}}{[(0.1)(\sigma_B)]_{0.7}}(f)^{0.74}$

(21) . . . . $f = \frac{[(0.1)(\sigma_B)]^{0.95}}{37.3(t/s)^{0.11}}(N_W)^{1.35}$

(22) . . . . $S_L = fV_{240} = \frac{58(t/s)^{0.0136}(N_W)^{1.08}}{[(0.1)(\sigma_B)]^{0.494}}$

$= \text{approx.} \frac{58.6(t/s)^{0.014}(N_W)^{1.08}}{\sqrt{(0.1)(\sigma_B)}}$

and finally V_{240} expressed in Nw and σ_B:

(23) . . . . $V_{240} = \frac{S_L}{f} = \frac{2160(t/s)^{0.122}}{[(0.1)(\sigma_B)]^{1.44}(N_W)^{0.27}}$

By means of these formulae, the ratio of cutting depth (t) and the feed (s) can be diagrammatically presented for any kind of steel in terms of its tensile strength σ_B.

Assuming a cutting ratio of t/s = 8:

(24) . . . . $N_W = \frac{17.35(f)^{0.74}}{[(0.1)(\sigma_B)]^{0.7}}$

(25) . . . . $f = \frac{[(0.1)(\sigma_B)]^{0.95}}{47}(N_W)^{1.35}$

(26) . . . . $S_L = \frac{60(N_W)^{1.08}}{\sqrt{(0.1)(\sigma_B)}}$

(27) . . . . $V_{240} = \frac{2780}{[(0.1)(\sigma_B)]^{1.44}(N_W)^{0.27}}$

$= \frac{1300}{[(0.1)(\sigma_B)]^{1.25}(f)^{0.2}}$

End of Part 1, this article. The concluding installment will appear in July, The Tool Engineer.

By Dr. (Ing) N. N. Sawin

Precision Measuring Instruments Made from Wood

Light weight reduces strains on large gages and provides easier handling

THE FRAME OF AN IDEAL measuring instrument for large workpieces (20 to 120 in. dimensions) should be made of a material which is light, yet resistant to deformation, and as sensitive to changes in temperature and humidity as the workpiece. Low weight is desirable for ease of handling and minimum strain within the gage, due to its own weight. According to the rules of precision measurements, an instrument should have the same coefficient of expansion as the workpiece.

For small and medium sized parts this statement is correct, but it must be modified to apply to large workpieces. The coefficient of thermal conductivity and specific heat must be taken into account in the latter case since, as we all know, large masses, in comparison with small masses, require considerable time to reach uniform temperature throughout. Therefore, for precision measurements of large objects it would be better to say that, in the direction of measurement, the measuring instrument should be affected by changes in heat and humidity to the same degree as the workpiece.

Advantages with Wood

A comparison between measuring instruments made of steel and wood in the light of the above requirements will be of interest. In either instance, of course, the measuring parts such as the anvil, spindle, and screw would be made of steel for wear resistance and would be securely fastened to the frame of the gage. Steel frames would be too heavy for convenient handling while accuracy would be impaired because of strains originating from the weight of the frame itself. These disadvantages would not be present in wooden frames of sufficient strength. See Fig. 1.

TABLE I

Average Weight of Woods Dried in Air*

Type of Wood	Weight in lbs./cu. ft.
Fir	24–30
Spruce	25–34
Pine	25–34
Walnut	40
Larch	33.6
Maple	40.5
Beech	50
Oak	39–48
Hickory	43.7

The expansion of wood due to heat is only one-half to one-quarter of that of steel and therefore can be neglected in most measurements. Since measuring instruments for large workpieces have to be set with standards, their expansion is of little consequence. Large parts are slow in reacting to temperature changes, sometimes taking a day or more to reach room temperature uniformly within 0.2 degree F. During the time that measurements are being taken, therefore, workpiece temperature may be considered constant.

*See also Kent, "Mechanical Engineers' Handbook," Vol. III, p. 5-21, Table I.

Thus, it is advantageous if the measuring instrument reacts as sluggishly to temperature changes as the work. The great difference in mass between gage and work dictates that this quality of sluggishness be achieved by poor heat conduction and high specific heat in the gage frame. In this respect, wood is much to be preferred. It is important that both workpiece and standard have the same temperature and be made of similar material.

TABLE II

Values of mean thermal coefficients of expansion per degree F. of several materials of construction**

Aluminum	0.00001233
Lead	0.00001516
Chromium	0.000003778
Grey cast iron	0.00000589
Copper	0.00000926
Magnesium	0.00001450
Nickel	0.00000566
Bakelite	0.000014
Steel	0.00000734
Zinc	0.00001653
Tin	0.00001275
Pine—Parallel to fiber	0.0000025
—Across fiber	0.000018

Wood has a peculiar sensitivity towards changes in the humidity of the air because of its fibrous nature. The dimensional changes in beechwood, for example, when humidity changes by one percent are in the direction of the fiber, 0.01 percent, across the fiber in the radial direction, 0.16 percent, and in the tangential direction, 0.36 percent. Similar coefficients in the tangential direction are 0.16 percent for spruce, 0.24 percent for fir, and 0.32 percent for oak. Prevention or reduction of dimensional changes caused by variations in humidity can be accomplished by the application of protective coatings to a wood surface. The results of numerous tests on the degree of protection against changes in humidity afforded by various protective coatings are listed in Table III.

TABLE III

Protective Ability of Various Coatings against Humidity

Protective Coating	Degree of Protection against Humidity in percent
Aluminum Foil, glued on***	100
Asphalt, single coat	98
Shellac, triple coat	85
Enamel, triple coat	75
Cellulose Lacquer, triple coat	73
Oil Paint, triple coat	70
Linseed Oil, triple coat	20
Furniture Wax, triple coat	10

***To protect the surface against damage in the shop, the aluminum foil was sprayed with aluminum.

**See also Kent, "Mechanical Engineers' Handbook," Vol. III, p. 1-05, Table 3.

Besides ordinary procedures of impregnating wooden instruments, full attention should be given to impregnation with hot liquid paraffin and colloidal wax solution in a vacuum.

Test Procedure

Solid bars made of maple and spruce 40 and 120 in. long with a cross-section of 0.800 x 1.400 and 0.880 x 2.400 in. were tested in a room at 68° F. with a variation in humidity from 50 to 70 percent. With a change in humidity of 10 percent, the bars 40 in. long changed in length 0.00056 in. and those 120 in. long changed 0.0016 in. There was a time lag as the bars adjusted themselves to a new length. Scattering of the results of these length measurements was relatively small and a representative average could be established.

Another series of tests with similar 40 inch maple and spruce bars in impregnated and non-impregnated state was made. Impregnation procedures employed for the spruce test bars were as follows:

1. Both ends boiled in paraffin.
2. Surface coated with hot linseed oil.
3. Surface coated with shellac.
4. Surface covered with an aluminum foil 0.00036 in. thick.
5. Surface sprayed three times with aluminum.

FIG. 1. Large Sawin Precision Measuring Instrument made of Wood. All instruments are impregnated and covered with aluminum foil. Upper and lower instruments in sizes up to 120 in., instrument in center up to 60 in.

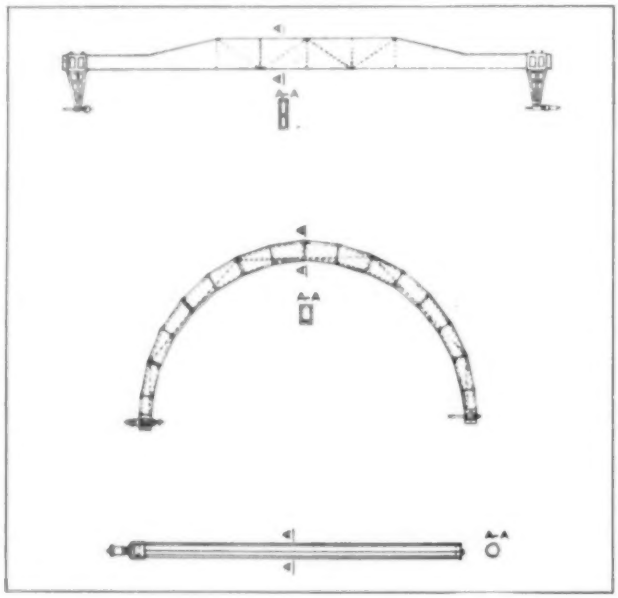
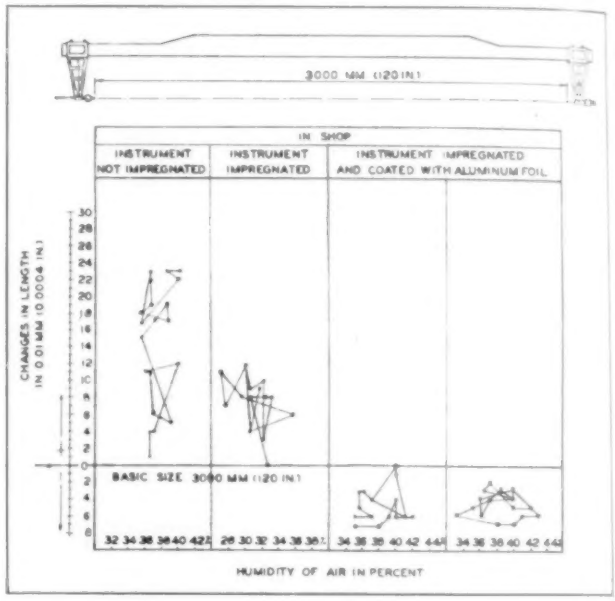


FIG. 2. Comparison of the Changes in Length of 120 in. Wooden Measuring Instruments. The instruments were made of fir boards and tested in the shop under varying humidity of air. Instruments investigated were of these varieties: not impregnated, impregnated as well as impregnated and covered with aluminum foil.



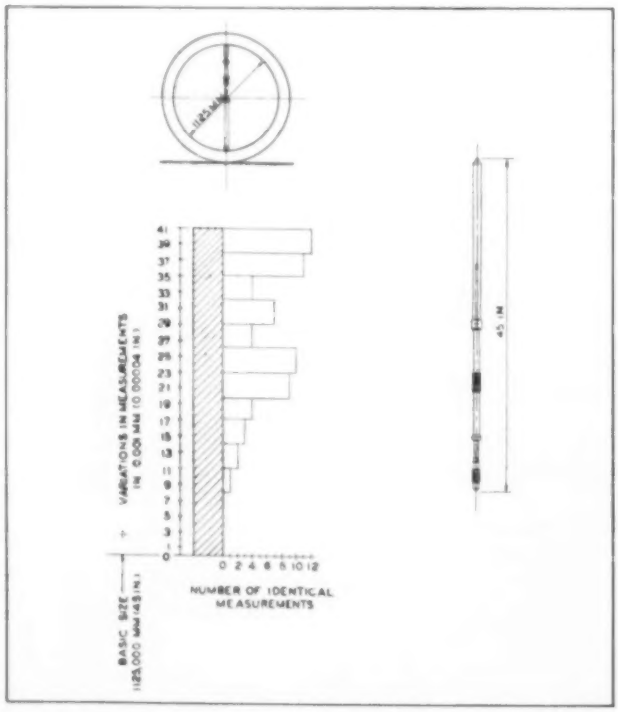


FIG. 3. Measurement Variations under Temperature Changes when using a Steel Measuring Rod with Micrometer. The measurements were taken in the same vertical position by seven different workmen. Workpiece was a hollow steel cylinder 1125 mm inside diam. (45 in.).

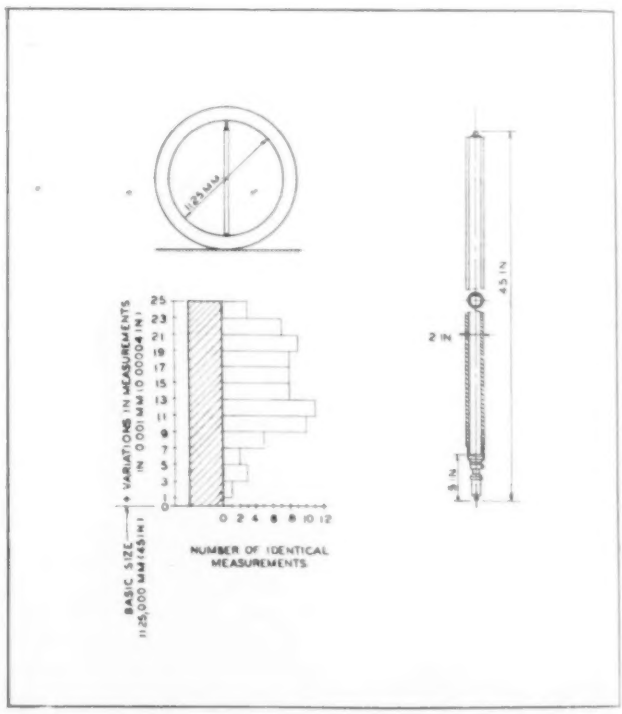


FIG. 4. Measurement Variations under Temperature Changes when using a Wooden Measuring Rod with Micrometer. The same workpiece was measured as in Fig. 3 under identical conditions. The measuring instrument was covered with aluminum foil and sprayed with aluminum.

With the exception of the fifth operation, the same procedures were used to prepare the maple test bars. Thus it was possible to ascertain the degree of protection against moisture and its effects on stability of dimension afforded by various means of impregnation or coating.

Changes in length were determined at 68 degrees F. on a SIP measuring machine in a temperature controlled room. Readings were taken every three hours during the day shift for a total of 24 within a week. Humidity and temperature were measured simultaneously. Aluminum foil glued to the surface was found to provide practically complete, almost 100 percent, protection against the influence of humidity. Boiling the ends in paraffin and coating with linseed oil as well as spraying thin layers of aluminum afforded only about 50 percent protection.

Other tests were made to check hollow wooden measuring instruments up to 120 inches O.D. These instruments in three different conditions, namely, non-impregnated, impregnated, and impregnated with an aluminum foil covering, were tested in both the shop and laboratory under a humidity variation of 27 to 43 percent. Again the aluminum foil proved best, protection from 80 to 100 percent being noted. See Fig. 2.

Further tests were carried on in the shop with hollow inside micrometers, 45 to 46 inches, insulated with aluminum foil. Results were excellent, see Fig. 4. Precision of wooden inside micrometers proved very high, deviations being smaller than those occurring when the same holes were measured with steel instruments. See Fig. 3. The design of this micrometer is rigid and light weight, $1\frac{3}{4}$ lbs., and with a support in the center or at the side the deformation is so small as to be negligible. When 75 measurements were made by 7 different workmen the variation in accuracy was ± 0.0004 in. Measurements of a steel ring 120 in. in diameter and a wheel 110 in. in diameter showed variations between 0.0012 and 0.002 in. for the ring and 0.0008 and 0.0016 in. for the wheel. Mass and stiffness of the workpiece affect the accuracy of measurements.

The use of wooden instruments for measuring large workpieces is a matter of history. Machinists, exhibiting a preference for them, have made them for their own use since their design has not, as yet, been undertaken by the engineer or standards expert. Practical results have indicated that insulation of the wooden parts (spruce covered by aluminum foil is completely satisfactory) against humidity changes combined with rational design and attention to basic rules of precision measurements will make these instruments absolutely reliable in the task of safeguarding interchangeability of large parts. They have already proven their merits in the research and establishment of standard tolerances for large diameter workpieces.****

****N. N. Sawin, "Calculations Improve Shrink Fits on Large Gears and Wheels," American Machinist, Vol. 91, No. 13, June 19, 1947, pp. 142 to 145.

Precision "Stamping" on the Broaching Machine

WHILE, AS A GENERAL RULE, surface broaching is considered as being an alternate to milling—and, in many instances, faster and more accurate—there are times when it can profitably replace other methods, such as stamping. A typical case is a telephone relay part, shown in the circled inset of the accompanying illustration.

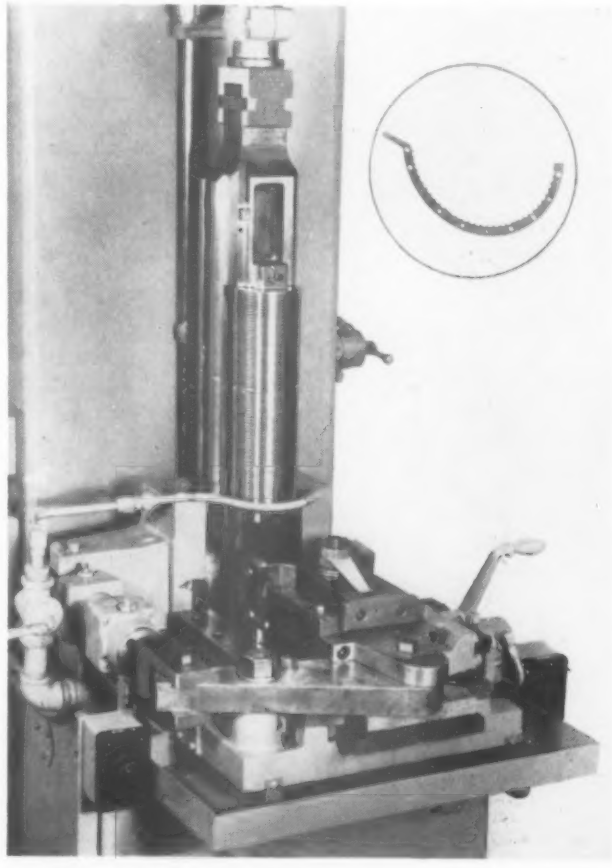
Each of these parts has three series of cam shaped slots that correspond to the ten numbers on the dial phone. Naturally, these parts are required to be highly accurate, a condition not so easily met by conventional stamping methods. For one thnig, wear on the dial would eventually cause variation, and for another, even the closest allowable fit between punch and die would throw up a burr.

To obviate the need for maintaining highly accurate dies, therefore, the parts were first stamped out to roughly .015" oversize on the I. D. and then stacked in a broaching fixture when a number of the parts are broached simultaneously in one pass and to required limits of tolerance.

In this case, two types of parts are involved. The rough stamping for the impulse arc is blanked to .015" oversize on the I. D. and is then finished broached as shown in the photograph. In addition, similar "centering" arcs are also broached. Major diameter of both arcs is 2.174", minor diameter 2.098", while tolerance on the arcs requires that the cam teeth surfaces be within 0° 3'.

The broach which cuts the 31 teeth on six of these parts is shown in the photograph, along with a hydraulically operated shuttle fixture which is interlocked with the machine cycle. Clamping, loading and unloading are manual, but broaching and shuttling are both automatic. The centering arcs are broached, with a somewhat similar broach on the same machine—a 6-ton vertical with 36" stroke. As worked out, the method of manufacture is simple yet entirely satisfactory both from the standpoint of accuracy and output, which is said to be in excess of 350 per hour. At any rate, the fixture alone presents an interesting case for study.

Several parts (shown in inset) are stacked in a hydraulically operated fixture and broached simultaneously. Broaching and shuttling are automatic, but loading, clamping and unloading are manual. The machine used is a Colonial 6-ton vertical with 36" stroke.



By R. E. Andrews

The ABC of Grinding Machine Tool Slideways

Profiled cup wheel grinding insures accurate fit of mating dovetail slides

WHILE THE GRINDING of machine tool slideways (of which various types are shown in Fig. 1) is now standard practise with many machine tool builders, there are still differences of opinion as to which is the best of the three methods commonly used to date. These are: peripheral wheel grinding, cup wheel grinding by the rim, and profiled cup wheel grinding, shown respectively at a, b, and c, Fig. 2.

The first has the advantage of removing considerable stock in one operation; consequently, it is not necessary to work to extremely close tolerances on preceding machining operations. There is, however, the consideration of distortion from localized heating when taking heavy cuts; also, it is not applicable to the grinding of dovetail slides.

In cup wheel grinding (b), the wheel is mounted on a swivelled spindle head so that the rim of the wheel can be presented at the required angle to the work. While more versatile than peripheral grinding, it has less capacity for stock removal—for that matter, it is only claimed to remove sufficient stock to insure accuracy and alignment. Therefore, preceding operations must be closely controlled.

Since, however, it is customary to tilt the wheel spindle slightly from the required angle, the wheel only presents its leading edge to the work; therefore, the ground surface becomes a succession of shallow hollows—as shown exaggerated in Fig. 3—instead of a true flat. And while all of the types of slides shown in Fig. 1 could be ground by this method, there is the disadvantage that the head must be set separately for every angle—e.g., the mating slides shown in Fig. 3 would require three separate settings for each member. There is, also, the further consideration that any inaccuracies resulting from the two angular settings would be doubled due to corresponding differences in the mating parts.

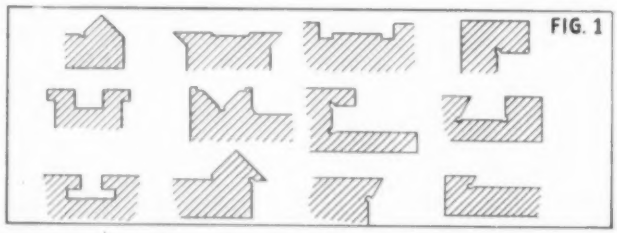
While a comparatively new method developed in England, profile cup wheel grinding* seems to obviate all of the disadvantages of the preceding while, at the same time, providing all of the good features of both. In this method, both the rim and the periphery of the wheel are employed for grinding dovetail ways, with a formed wheel used.

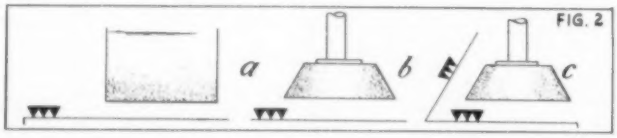
The grinding wheel spindle is maintained permanently vertical, and angular ways on the grinding machine, used for truing may be permanently set to 60° if so desired, or to any predetermined angle. To true the angular periphery of the wheel, the diamond is set on the center line (or axis) and the wheel traversed to and fro past the diamond by engaging the wheel-head with the lead screw of the angular slide. Thus, there is imparted to the wheel periphery the exact angle set by the slideways, and this is maintained on both mating parts.

It is claimed that no difficulty whatsoever is experienced with machines employing this method of using the whole of the rim of the wheel when grinding flats and removing as much as .001" per pass. Naturally, this postulates the use of a machine of the portal type provided with a rigid spindle construction.

Since the angle is created on the wheel with the spindle vertical, it would naturally follow that the angle would be equal on both sides. Thus, no resetting would be required for grinding the flats and the left hand and right hand dovetails shown in Fig. 3 and at bottom of Fig. 4. Furthermore, any slight deviation from the established angle would be of little importance considering that precisely the same angle would be imparted to both mating members.

* This method has been patented in England and the U.S.A. by Arthur Scrivener, Ltd., of Tyburn Road, Birmingham, England. Incidentally, this company is one of the European pioneers in crushed form grinding.





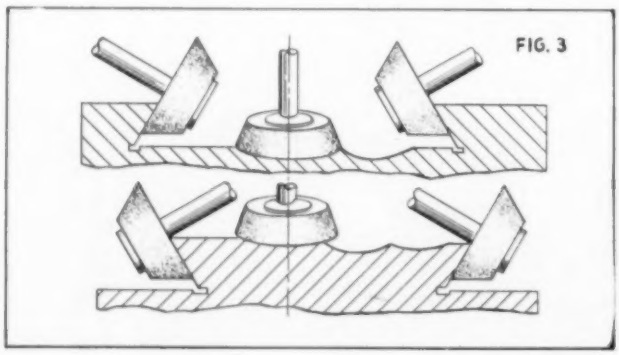
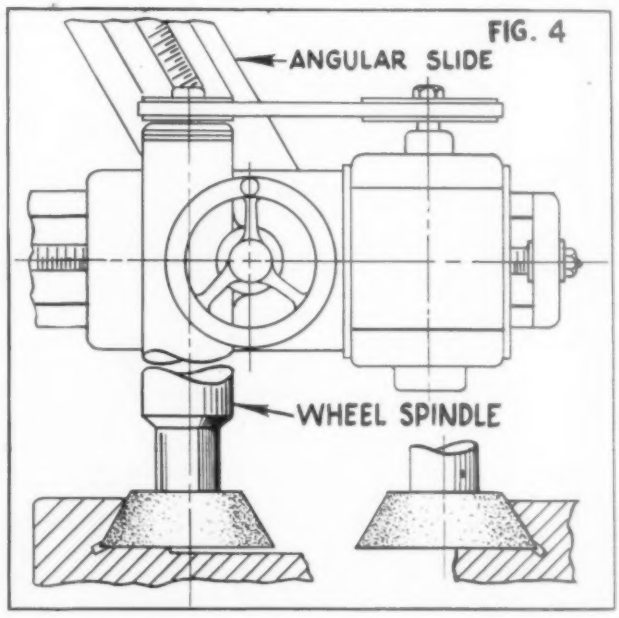


FIG. 1. Various types of slideways. Fig. 2 (a) Peripheral grinding; (b) cup wheel grinding by the rim; (c) profiled cup wheel grinding. Fig. 3 shows how three separate settings would be required, for each member, with method (b). Note the hollow (exaggerated) resulting from tilting of spindle. Fig. 4. A schematic diagram of profiled cup wheel grinding with spindle vertical.



By **Robert W. Shaeffer**

Patterns From Casting Resins

The technique and procedures for making foundry patterns from synthetic resins

THERE ARE ADVANTAGES as well as disadvantages in the use of Durez casting resin. For one thing, patterns vary widely in shapes and sizes and must, of necessity, be varied in methods of approach toward the means of producing production foundry pattern equipment. However, the following method, which is illustrated by diagrams (Operations 1 to 6) and descriptive captions, is usually applicable to most patterns:

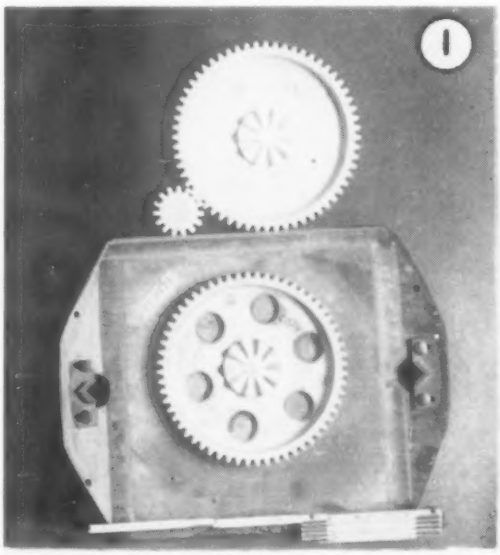
Mr. Shaeffer **is connected with Robert W. Shaeffer Associates, Engineers to Industry, Benton Harbor, Mich., who, over a period of time, has specialized in the making of foundry patterns from Durez resins.**

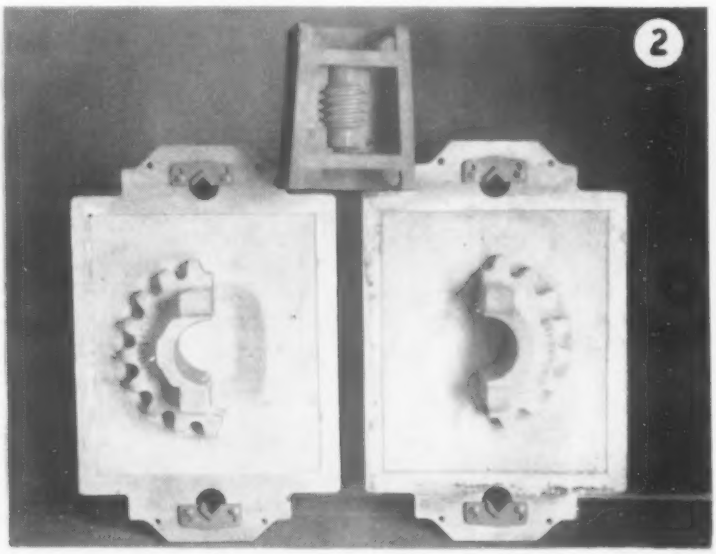
The pattern is placed on a surface plate and "blued" up at the approximate parting line. Next, a square is rubbed against the pattern all the way around to accurately locate the exact parting line and to mark same.

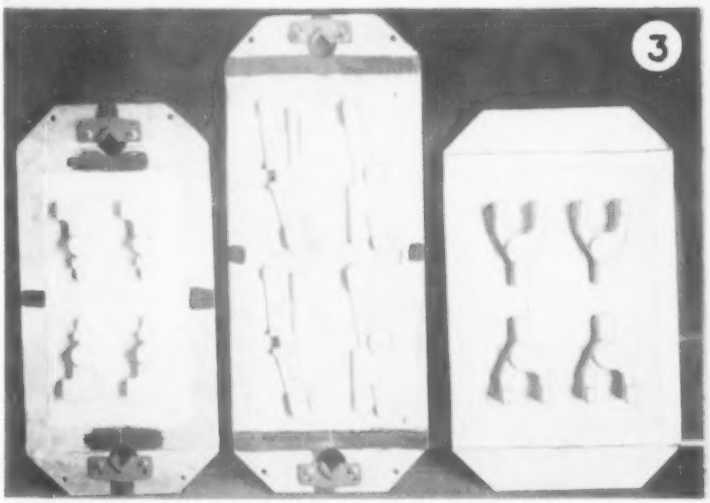
The "match" is then produced by building up to the parting line with modeling clay, plaster or moulding sand, enclosing it in a box and pouring plaster over the pattern and built up clay. Dowel pins must be cast or drilled and reamed into the match to align the two halves together for subsequent operations.

All of the cope or drag sections are cast, together with dowel pin holes from the original match. After completion of cope or drag sections, each is numbered and the other half is cast upon it, being careful to keep in pairs and to preserve the perfect match.

Photo No. 1, cast resin gear and pinion reproduced from production gears "without shrinkage," for production patterns. Advantages:—light weight and ability to receive gears from sand without draft on gears. Photo No. 2, cast iron match plates for 16" x 18" flask and cast iron core box for worm gear. Left to right, Photo No. 3, cast resin match plates for 12" x 16", 10" x 22", and 10" x 16" flasks. Photo No. 4, cast resin match plate for 16" x 16" flask. Drag side shown. Plates used on jolt to squeeze production molding machines. Photos by courtesy of Superior Steel & Malleable Castings Company, Benton Harbor, Michigan.







The next step is to lay the cope or drag sections face down on the surface plate, surround with flask and group together in the position which they are to occupy on the finished plate. They are then bound together with plaster so as to make one piece of plaster with the various impressions properly arranged. The assembled cope or drag section is now turned face up, dowel pins are placed in holes previously cast, and the halves placed upon their corresponding numbers.

We now have two pieces of plaster comprising the cope and drag sections of the match plate, which are kept in alignment by dowel pins in the flask. Gates and runners are then cut into the plaster as required, and the plaster halves are now ready for drying, after which they are coated with paint and waxed with a hard auto wax, and polished.

An aluminum frame $\frac{5}{8}$" thick, channelled out all the way around $\frac{1}{4}$" inside the flask line to retain the cast plastic, is now placed between the two plaster halves encased in the sectional flask, and clamped together. The mould is now ready for filling with resin, after which it is allowed to remain at room temperature for eight hours, and then baked at 140 degrees F. for eight hours. After the casting is removed from the mould, very little clean up is required if reasonable care has been taken with the plaster mould.

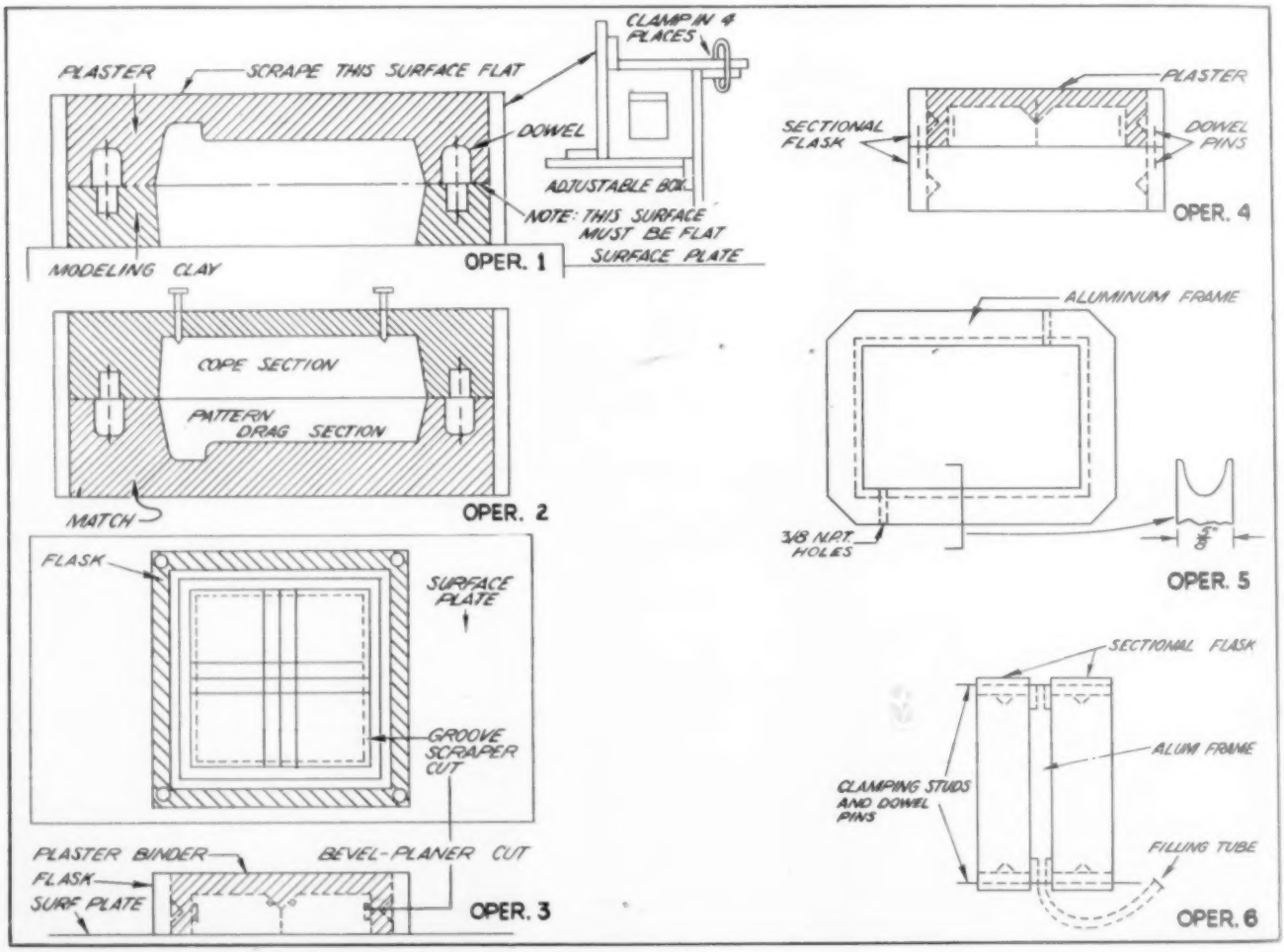
The factors that lend themselves to economy in this type of pattern equipment are the minimum amount of cleanup required and the shrinkage factor of .0025" per inch. This is offset, in turn, by plaster expansion of .0015" which permits the usage of experimental or single shrink patterns for masters. These patterns have adequate strength for the conventional type jolt and squeeze moulding machines and are being used for high production runs.

When large patterns are made "single shrink" for experimental purposes they can usually be used as the master pattern for a production foundry pattern when the .001" to .002" shrink per inch is not important. It follows, then, that all types of "gated" patterns and "loose wood" patterns can be used as masters to produce a production match plate. Also, gang core boxes and single core boxes are very satisfactory and economically produced with good wearing qualities.

Of real interest to the moulder is that, being an inert matter, the plastic material will cause no condensation when being used with hot sand; thus, there is no consequent loosening of the sand when the pattern is drawn thereby reducing pits caused by sandflow. This is an important item when castings are to be plated or painted.

As previously stated, however, there are disadvantages in the use of casting resin for match plate patterns, especially where thin sections or sharp. chipping or breaking occur in a vulnerable place. Nevertheless, the resins effect marked economy where conditions permit their use.

The "how" of procedure: Operation 1. (a) Position part on surface plate; locate and mark exact parting line. (b) Surround with adjustable box; build up to parting line with modelling clay or plaster, into which (c) position two brass dowel pins. (d) Apply parting compound and fill box with plaster, scraping flat before it sets. Remove from box. Oper. 2. (a) Place match from Op. 1 on surface plate; encompass in adjustable box with dowel pins in previously cast holes. (b) Put nails as required in pattern to blow apart, apply parting compound; fill box with plaster, striking off flat. (c) Apply air to nail holes, to separate. Repeat as required, casting all cope sections from the match and all drag sections from cope sections, number each as cast. Keep in pairs. Oper. 3. (a) Select cope or drag sections with depressed portion and lay face down on suface plate; groove all outside and bevel all inside mating edges. Note: If neither cope or drag are flat, pour plaster and relieve sections so they can be placed on a flat surface. (b) Position flask about sections and fill with plaster to bind sections together. Oper. 4. Insert dowel pins in cast holes with plaster on its corresponding number; groove and bevel. Prior to seating, place other section of flask on 1st. half and fill with plaster. (b) Separate and fill dowel holes with plaster. (c) Cut gates and runners. (d) Dry plaster halves. (e) After drying, coat with plaster sealer; dry and apply two coats clear lacquer; dry and wax. Oper. 5. Prepare an aluminum frame, cored out to retain the plastic. Coat all metal that comes in contact with the resin with "vinylseal" adhesive to prevent reaction and cause resin to adhere to the plate. View (Oper. 6) shows assembled flask and plate ready for filling with plastic.



By **Earle Buckingham**

Load Rating of Gears

A Standard Method of Rating is Necessary for a Fixed Basis of Comparison

THE ACTUAL LOAD CAPACITY of any particular pair of gears is a unique and individual value. No two pairs of similar gears will have exactly the same capacity. This actual capacity depends upon many variables, among which are the following:

(a) Design of tooth forms; (b) actual physical properties of the materials used; (c) accuracy of the gears themselves; (d) smoothness of the tooth surfaces; (e) accuracy and rigidity of the mounting; (f) polar moment of inertia of the gear blanks; (g) polar moment of inertia of the connected masses and the elasticity of the connecting members; (h) pitch line velocity of the gears in operation; (i) character and intensity of the loading; (j) lubrication and cooling; (k) particular history of initial running-in and loading of each individual pair; (l) length of life required; and many other factors.

Earle Buckingham **was graduated from the U S. Naval Academy and, during World War I, served as a major in the Ordnance Department. Then, after several years at consulting engineering, and as representative on the Nat'l Screw Thread Commission, he joined the faculty of the Massachusetts Institute of Technology as Professor in the Department of Mechanical Engineering.**

A member of the ASME, among other technical societies, he is chairman of the special Research Committee on Worm Gears, and acting chairman of the committee on Strength of Gears. Author of four technical volumes—"Principles of Interchangeable Manufacturing"; "Involute Spur Gears," "Spur Gears," and "Dynamic Loads on Gears"—and widely experienced in various branches of industry, he is a recognized authority on measurements and gears.

For general design purposes it is necessary to have some reasonable criterion—preferably as simple as possible—which will prove to be satisfactory for the great majority of the installations. In the final analysis, each manufacturer of a particular type of product must determine for himself, by trial and experience, his own safe limiting values.

On the other hand, values which prove to be adequate for transmission gears in passenger cars, for example, cannot be used safely in some other field, such as machine tools. The load, life, and service conditions in the different fields are so different that values determined directly from one type of service may have but little relation to the values needed in an entirely different type of service.

Empirical relationships of this type hold true only when all of the operating conditions are very similar. These circumstances account for the wide differences of opinion that exist about this subject of the best load rating of gears. A complete dynamic analysis—if such were possible—should be able to reconcile the data obtained from all of the different fields of application.

Such a complete dynamic analysis is probably beyond our powers at the present time. Nature is so complex that in any such analysis, many simplifying assumptions must be made in order to keep the problem within our limited capabilities. This means that many factors are either ignored entirely or are represented by reasonably approximate values. As a result, even our best efforts introduce some appreciable margin of error.

A Conservative Approach

The question then arises, when making these assumptions of whether to take the chance of making the calculated values greater than the actual ones, or to be conservative so that the calculated values, if anything, will be less than the actual ones. The writer's opinion is that the conservative policy should be followed. As noted before, when any great volume of production is involved, the only safe way is to calculate as closely as possible and then "try and see" by actual experiment to obtain the final answer.

In some applications, we must be absolutely safe even though it means an increased cost of production. In other cases, size and weight must be kept to a minimum even though it may involve a more or less frequent replacement of worn out parts.

For many competitive products, it is necessary to have some common or standard method of rating the load carrying capacity of the units so that potential customers can have a fixed basis of comparison. The relationship between the rated capacity and the actual capacity of any specific unit for any given condition of service may vary greatly. Some compensation for this may be introduced by the application of service or use factors. Nevertheless, the rated capacity and the actual capacity will be two different things.

We will now consider briefly the load rating and service conditions in several different fields such as: (a) Commercial gear reducers; (b) automotive practice; (c) marine reduction drives; and (d) general and special machinery and tool design. We will also consider the possibilities of setting up a reasonable analysis of the dynamic loads and its application to all fields of service.

Load Rating and Service of Gear Reducers

In the final analysis, the rated load capacity for standard gear reducer units, used with electric motors, is based on the horsepower rating of the motors with which they are used. A ten-horsepower reducer set, for example, is one which stands up in service in the great majority of cases when coupled to a ten-horsepower electric motor. Trouble is experienced in only a small percentage of such drives which are installed.

For the purpose of the load rating it is assumed that a ten-horsepower motor delivers the full power. Actually, in the great majority of cases, the full torque is applied only when starting and only intermittently, if ever, during operation. The average transmitted load will generally be between fifty and sixty per cent of the full rated load. When these units are used in some process industry where the average load is practically the full rated load, then these units generally have a very short useful life.

To meet these different service conditions, use or service factors are applied which give larger and stronger units for those applications where the rated power and the average power are more closely in agreement. The standard load ratings of the AGMA apply primarily to these commercial gear reducers.

Automotive Load Rating Practices

The gear load rating practice in the automotive field is based on many years of experience with their product and its particular service conditions. This, in itself, is divided into several different fields such as: (a) Passenger cars; (b) trucks; (c) busses; (d) rail car drives; (e) airplane propellor drives; and (f) motor-boat drives and miscellaneous service conditions.

Passenger cars. The actual load capacity of the transmission gears of a passenger car is based on full-load, and life tests of units which prove in practice to be adequate for a reasonable useful life of their product. For example, a second speed gear drive which will stand up something less than about twenty hours' continuous running at full speed and full engine torque, under test, will generally give several years of normal use in actual service.

In service, the average engine torque is much less than its full value, and the actual time of operation of the second speed gear is but a very small percentage of the full operating time. Size, weight, and cost of units are important factors here. A gear drive that would last fifty years would add nothing to the value of a car whose useful life otherwise is very much less than this. On the other hand, a gear designed for fifty horsepower in the transmission of an automobile would have a very short useful life in a machine tool requiring the same power.

Trucks. The transmission gears in a truck are called upon to deliver more power, for longer periods of time, than those in a passenger car. Based on actual service experience, the gears in trucks, for a given size of engine, have roughly doubled the load carrying capacity of similar gears for passenger cars. Even here, the average service conditions on a truck are not as continuous or severe as those on many machine tools.

Busses. A bus makes many starts and stops. As a result, the gears in the transmission are loaded a greater percentage of the operating time than those of passenger cars and trucks. Consequently, the gears in busses have roughly about three times the actual load carrying capacity of similar gears in passenger cars.

Rail cars. Rail cars operate on steel rails with limited grades. As a result, the average torque delivered by the engine is closer to the maximum engine torque than on any other type of automotive vehicle. In other words, rail cars do not need and do not have the surplus torque capacity required for quick starts and acceleration on steep grades. Roughly speaking, the gears here have about four times the actual load carrying capacity of similar gears in passenger cars.

In addition, with all of these automotive vehicles, the maximum engine torque is controlled to a great degree by the traction of the wheels on the road bed. The final drive is a friction or traction drive. This condition of service has a direct influence on the nature of the gear-tooth loading.

Airplane propellor drives. Size and weight are very important considerations in airplane design. Here, a limited useful life for the gears, which results in appreciable saving in weight and size, is well worth while. Also, the torque is limited by the resistance of the propellor as it revolves. In this case, a drive which stands up for a 200-hour test at full load and speed is generally adequate.

Motorboat drives. Here also, the torque is limited by the resistance of the propellor in operation. The average power transmitted by the engine in a motorboat is a great percentage of the full engine torque than on any other type of automotive vehicle except the rail car. As a result, the motor is generally heavier than for passenger cars as the actual service. These again are different than for any other type of automotive vehicle.

Marine Drives

Most marine drives are high speed drives and transmit very large amounts of power. Some of them have double reductions. The pitch line velocities of the high speed gears generally range from about five thousand feet per minute up to over fifteen thousand feet per minute. Here, the dynamic load conditions are controlled largely by the elastic—or asymptotic—properties of the design, so that the difference of speed in this range has very little influence on the intensity of the dynamic loading.

Again, the materials used on these drives are more or less standardized, based on service experience. In most cases, the load rating of such gears is determined by the diameters of the pinion, the face-widths of the gears, and an empirical unit load factor. These drives are in continuous operation for long periods of time.

General and Special Machinery and Tool Design

This group covers the general range of machine design. A detailed analysis, here, would involve the sub-division of this phase of gear loading into many specific fields. Thus, for punch presses and piston pumps, we have a maximum load repeatedly applied at the same area of the gear mesh. We must design for this maximum load.

On steel mills, for another example, we have a maximum load imposed when a new billet first hits the rolls; consequently, the maximum load is imposed at different random areas of the gear mesh. In this case we design for continued life under average loads, and for resistance to tooth breakage under the maximum load. In other cases the starting load may be the greatest; in any event, we must have some reliable measure of the load capacity of the gear drive and balance it against the average load, or against the maximum load as the service conditions dictate.

We do not make these units in large quantities. Sometimes, we are making only a single unit. Break-down of production equipment is therefore troublesome, time-delaying, and expensive, and over-strength here is well worth all it may cost since it does not pay to take unnecessary chances. In addition (although we may know the total power input to the machine), we do not always know how the power is distributed through the several gear meshes in the complete machine. Whatever values the machine designer and tool designer may use, therefore, they must be conservative and based on the actual power transmitted. Any small economy of initial cost will be more than overbalanced by an unexpected failure in service.

None of the empirical values and relationships, established from experience or tests in other fields of service, can be used here safely. This general field of machine design needs a fundamental dynamic load analysis to meet the many varying service conditions that exist on different types of machines and tools, together with actual experience in this field.

Dynamic Load Analysis

A theoretical analysis is an attempt to link cause and effect. It is the application of science to the solution of a specific type of problem. The final result must be a reasonable and plausible explanation of the results of the test

data and also must explain the results of conditions encountered in service.

The beginnings, at least, of such an analysis of the dynamic loads on gear teeth have been made, by the ASME Special Research Committee on the Strength of Gear Teeth, as the result of several years of testing comparison of much service data from many sources, and from study. It has been applied directly in many plants for periods of time now up to twenty years and more.

In one of the first large plants to use it—an organization which must maintain its product in service in the plants of its customers—they have reported the two following items: First, they have not had a single gear failure in normal operation of their equipment since they have used it; and second, their cost of gear maintenance has been reduced over $50,000 a year since this practice has been in full operation. All this has been coupled with a rigorous analysis of all elements of their machines. The practice worked so well on the gears that they have applied it to all of their mechanical elements.

This analysis shows that the dynamic load is a momentary impact or maximum load which is a reaction of the influence of errors in action of the gear teeth. The average load, of course, is the applied load. This dynamic load must be balanced against the limiting beam load of the teeth and also against the limiting wear load. The limiting beam load is determined from the Lewis equation and the use of the flexural endurance limits of the materials used.

The limiting wear load is determined from the use of Hertz equations and the use of available test values of the surface endurance limits of the materials used. Tests are still being conducted to obtain values for a greater variety of materials. In the absence of test results on all materials, many empirical values for the surface endurance limits of materials, based on average service data, are being used also.

This analysis is also being used in practically all fields of gear design. The comparison of these results with the practice found adequate for service gives a direct measure of rated capacity with full potential continuous load values.

Pros and Cons of a Formula for Drawing Shells

The Tool Engineer:

Thinking it might confuse some of the younger members, I wish to call attention to errors in the last (February) article by Mr. James Walker, on drawing dies. It states the blank diameter is the result of: $P = \sqrt{d + 4dh}$ It should read: $D = \sqrt{d^2 + 4dh}$ Then, on adding a flange, it is stated: $D = \sqrt{d_2 + 4d_1h}$ It should read $D = \sqrt{d_1{}^2 + 4dh}$ These formulas are correct if we disregard any radii and assume square corners.

EDW. C. PORSBERG

The Tool Engineer:

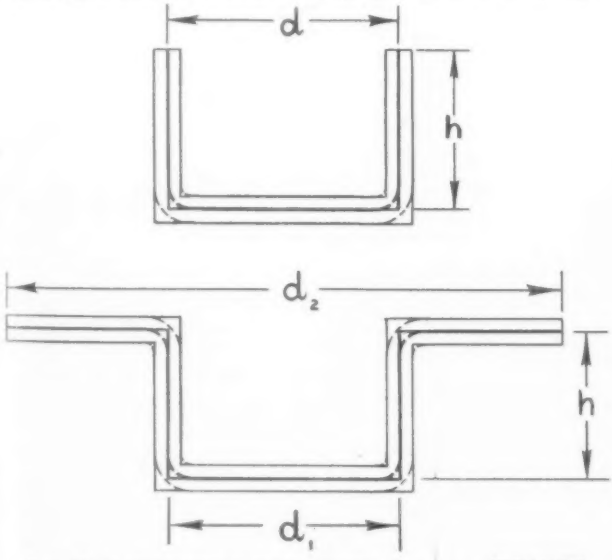
In answer to the comment by Mr. Porsberg, neither his or my printed formulas are exactly correct. Must have been a typographical error and should you wish to run a correction, it should read as follows:

For flangeless shells, previous to the cupping operation, Dia. (D) of blank should be $D = \sqrt{d^2 + 4\,dh}$ For flanged shells, previous to the cupping operation, Dia. (D) of blank should be $D = \sqrt{d_2{}^2 + 4d_1\,h}$.

See sketch, in which the heavy line represents the neutral or mean diameter and length. To avoid repetition or confusion, I use d, d_1, and d_2, or d, sub 1 d, and sub 2d. All radii disregarded as it would confuse rather than aid in approximating blank diameters.

JAMES WALKER

D = Dia. of Blank previous to the cupping operation, then: $D = \sqrt{d^2 + 4dh}$



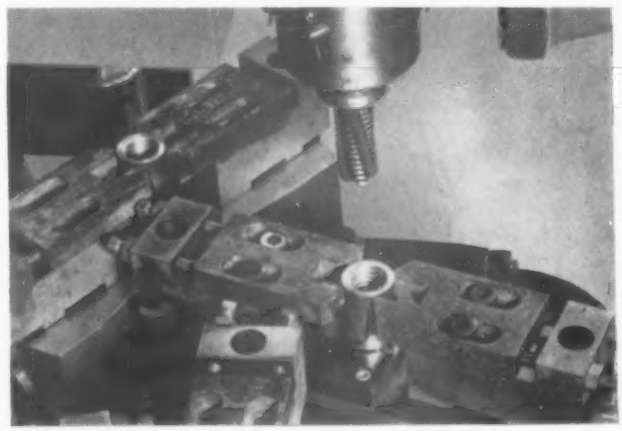
D = Dia. of Blank previous to drawing operation, then: $D = \sqrt{d_2{}^2 + 4d_1h}$

In the printed presentation, a typographical error occurred in that P was used instead of D in the first formula. In view of the great interest in this series and because, apparently, only one typographical error occurred in the 10 installments, it is suggested that the many readers who have filed the series incorporate the correction with the February installment.

THE EDITORS.

Tough Tapping Job Made Easy

BLIND TAPPING 6-pitch threads in extremely tough rock-bits was made easy at the plant of the Timken Roller Bearing Company, Mt. Vernon, Ohio, by a combination of good tools and ingenious tooling. Five operations were required to finish the parts—rough drill, finish drill, face, counterbore and tap, in the sequence stated. The job was tooled for a 5-station machine, in which the tapping was the key operation due to a special radius form which imposed an unusually heavy load on the one-thread chamfer of the bottoming tap. This also required rugged fixtures to withstand the tapping torque. The taps—of spiral fluted type especially designed for the job by Detroit Tap & Tool Company—and other cutting tools used, produced some 15,000 rock-bits each.



By George W. Bruck

It Pays to Experiment

Flood cooling and the right grinding wheels increase production and improve surface finish

OUTPUT OF GRINDING MACHINES can be considerably increased, in many instances, by experimenting with coolants and grinding wheels, both of which bear on wheel wear, depth of cut, and ratio of in-feed to volume of metal removed. Experiments in our grinding department provide examples which should be of interest to others doing a similar kind of work. The machine used was an abrasive vertical spindle machine provided with controlled link chain 2-speed table traverse and a manually operated downfeed, and equipped with a magnetic chuck. A cup grinding wheel turns at approximately 3750 RPM.

George Wm. Bruck **is general grinding foreman at the Pipe Machinery Company, Cleveland, Ohio. In addition to having taken a 5-year course in factory management, he has made material contributions and improved production methods.**

After trials with several types of coolants, we decided on a well known thread grinding oil—quite a departure from water soluble coolants normally used. In order to deliver a sufficient quantity of coolant, however, it was necessary to add an auxiliary tank and pump to the regular system. This increased the coolant volume to 40 gallons.

The coolant is delivered to the grinding wheel from three separate outlets: one, in the center of the spindle, throws a stream of oil directly on the inner surface of the cupped wheel at approximately 1 inch to 1½ inches from the point of contact of the wheel and work. The other two outlets, one of which is located to the left of the wheel at approximately one inch from the point of contact, with the other directed from the right at the exact point of contact of the wheel and work, work from outside the spindle housing. The locations of these outlets are of utmost importance for two reasons:

If the two outlets—i.e., the one operating from inside the housing and the other outside and to the left of the wheel—are not situated ahead of the point of contact, the air pocket surrounding the wheel when it is in operation will carry the coolant beyond the grinding point and be of little value. The work will burn, making it difficult to hold size besides creating excessive fumes and causing the wheel to break down rapidly.

Outlet Locations Important

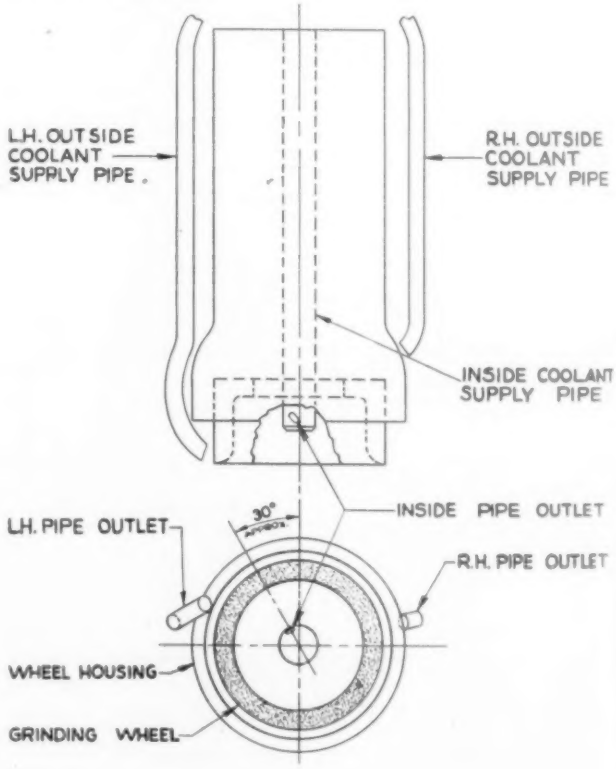
The outlet to the right becomes important when actual grinding starts. As stated above, it is directed at the exact point of contact, and its purpose is to cool the red hot particles of metal which the grinding wheel is removing. Without this condition, the particles build up on the splash guards and create a fire hazard unless promptly removed or cooled.

Grinding wheels were our next problem, as the regular wheels we had used with water soluble coolant would not react the same when the oil coolant was introduced. We finally settled on a type such as a Norton 38 A 24 J 8 UBE wheel for grinding hardened steels of 63-66 Rockwell Scale C hardness. A Robertson WA 46 K wheel was also tried and compared for grinding unhardened metals and, so far, has been highly satisfactory. The grinding time, stock removal, finish and wheel wear are factors that can be elaborated on by citing two examples.

Two sets of four pieces each of hardened (Rockwell Scale C 62-64) cutting blades, 3¼″ long, 1⅝″ wide, and 7/16″ thick, are ground in five minutes floor-to-floor time. This includes picking the eight pieces from the tray, loading them on the chuck, grinding, unloading, washing them in kerosene and replacing them in the tray. The operation consists of grinding a flute the entire length ⅜″ wide and at a 15° angle. Uniformity within a set is held and a high standard of surface finish is maintained. Wheel wear is approximately 0.015″ to 0.025″ per load.

The major portion of the stock is removed in the first pass, with two light finish passes to remove the balance of the stock and to provide the required finish. Formerly, this job was routed to the milling department, where the flutes were milled on a setup by which one piece was done at a time, while another was being loaded. After the milling and hardening operations, the blades were sorted in sets and finish ground in the flute. The grinding time by the new method equals the milling time formerly necessary to rough the flutes, and entirely eliminates the original milling operation with a consequent saving of milling machine time, plus original cutter and resharpening expense.

The inside (center) outlet throws stream of coolant directly on inner surface of cupped wheel. The R.H. and L.H. outlets direct coolant to the work and to the O.D. of the grinding wheel, respectively

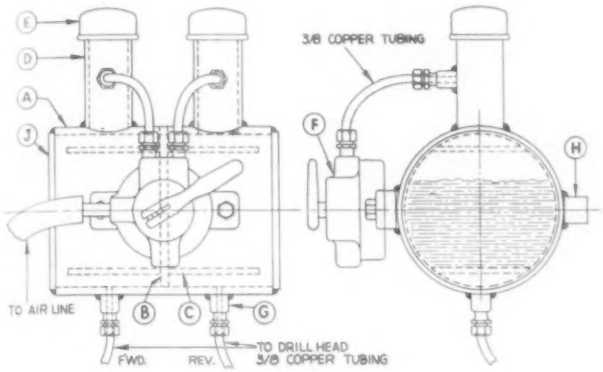


GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Hydraulic Pressure Unit

IN DESIGNING a small center drilling machine, a hydraulic pressure unit—of the type shown—was used in place of an expensive pump, which was not available at that time. While the unit only gives a low pressure (equal to compressed air line pressure), it proved satisfactory on this job and gave good results over a number of years.



Construction is very simple, the "gadget" being fabricated from pipe and steel plate. The body (A) of the tank is std. 8" pipe, with a bulkhead (B) welded in the center, and ends (J) welded on. The baffles (C) are $\frac{1}{8}$" plates to prevent excessive turbulence of the oil. The filling necks (D) are short 2" pipe nipples, closed with pipe caps (E). The control valve (F) is a std. four way air valve, and the hydraulic cylinder (not shown) is a std. $2\frac{1}{2}$" bore, 6" stroke double acting cylinder. Connectors (G) for the copper tubing fittings are std. pipe sleeves sawn in half and welded on. Holes are drilled through into the tank, of course. Block (H) is for mounting and is tapped to suit.

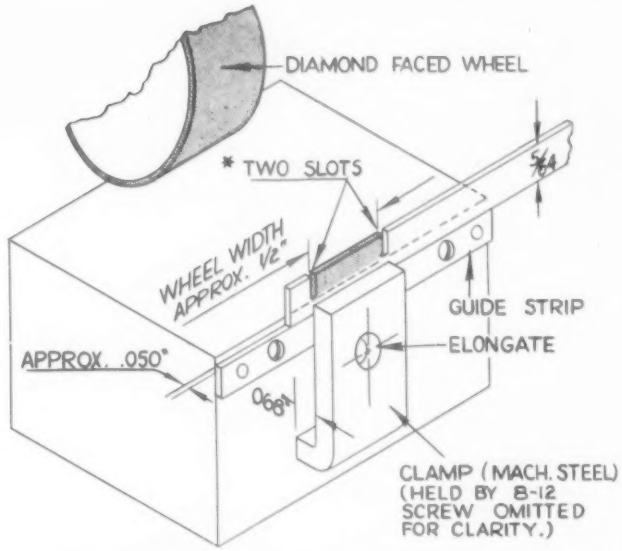
Operation is as follows: Each side of the tank is filled about $\frac{3}{4}$ full of oil, and dry, compressed air at 100 psi is connected to the valve (F) which directs air to the left side of the tank. Air pressure on top then forces the oil out tube "Fwd", and operates the hydraulic cylinder. Reversing the valve exhausts the left side of the tank, and applies pressure to the right side, thus forcing oil out the reverse—"Rev."—tube and reversing the cylinder, which returns oil to the left side of the tank.

This unit is not intended to replace conventional hydraulic pumps, but it does have some applications where ease of control of a hydraulic system is desired with a low initial cost.

Geo. W. Brown, Atlanta, Ga.

Fixture to Notch Carbide

A GOOD WAY TO WORK a notch in a piece of cemented carbide is by use of a fixture, of the type illustrated, in combination with a diamond wheel. The fixture shown, considered necessary because commercial carbide sections are comparatively rough in finish and hard to hold on a small area in a vise, was made to cut a notch .078" deep in a length of thin section carbide. However, dimensions may be varied to suit requirements.



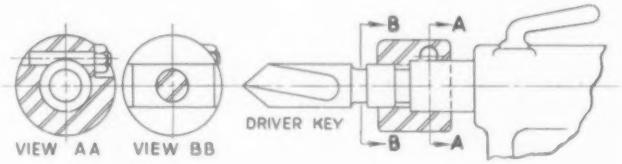
* AREA IN NOTCH TO BE REMOVED BY DIAMOND WHEEL, SHOWN SHADED.

To use, first grind two slots with a thin section diamond wheel of the sort ordinarily used for cutting-off operations. These slots should be as deep as the notch is to be, as far apart—outside to outside—as the width of the slot, and about .015" wide. This prevents drag on the sides of the wheel and makes cutting easier, speeding the work. The fixture is held on the grinder by means of the magnetic chuck.

E. Diskavich, Torrington, Conn.

Driver for Shanked Tools

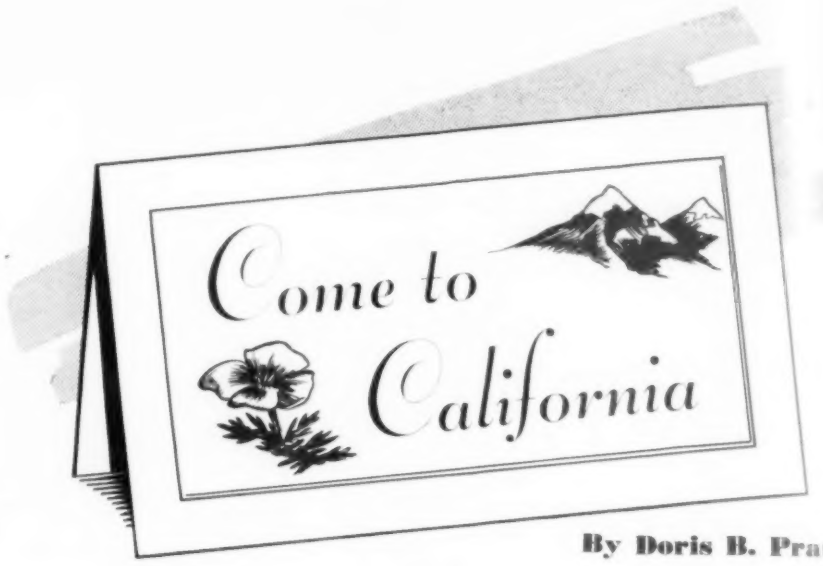
LARGE DIAMETER cutting tools with comparatively small taper shanks, used in drill press or lathe tailstock spindles (shown), tend to turn and loosen due to inadequate grip on the taper. Such tools may be held solidly under heavy cutting torque with the driver illustrated while, at the same time, they are easily removed and reinserted.



The driver, made round for safety, is bored one end to fit the machine quill, and locked as shown in view A-A. The other end is slotted. The tool is provided with an integral or brazed-on key—view B-B—which fits the slot and takes the entire cutting load, thus relieving taper shank and tang (if any) of any undue strain.

James Maltby,
Garden City, Mich.

THE TOOL ENGINEER will pay $5.00 and up for accepted contributions to our gadget pages.



By Doris B. Pratt

Los Angeles Tool Engineers Invite Society For Semi-Annual Meeting, October 11-12-13

OF COURSE, you've always wanted to. And the family has teased you to take them to the alluring West Coast. But you've begged off with something about business being too urgent. Now, both business and pleasure beckon you to Los Angeles, October 11, 12, 13, when ASTE members and their families get together for the Sixteenth Semi-Annual Meeting of the Society.

On the way you'll meet fellow members from everywhere. For an ASTE special train is scheduled to leave Chicago, Thursday noon, October 7. The Diesel-hauled cars will roll through northern Illinois, crossing the Mississippi to enter Iowa at Fort Madison, cutting across the southeast corner of the state through orchard and vineyard country, then southwesterly by Missouri mining and farming communities.

At 9:15 that evening there's a half-hour stop in Kansas City to stretch, and to welcome the local and St. Louis contingents as they join the party; another halt at 12:55 A.M. in Newton for the Wichita delegation to come aboard. Next morning you'll rise from your comfortable Pullman bed to find yourself at La Junta, Colo., for a 20-minute stop to pick up the Denver Tool Engineers.

All day you'll travel among the Rockies. Pushed and pulled by three locomotives, your mobile hotel begins a 1636-foot climb at Trinidad, making the ascent in 15 miles. Still climbing, you see colorful mining towns of lusty pioneer days, until the highest point on the line, 7,622 feet, is reached at the entrance to the Raton Tunnel. The train approaches the half-mile bore in Colorado, emerges in New Mexico.

Along the Sangre de Cristo range, the route dips and rises again to a 6392-foot altitude at Las Vegas; pushes on to Santa Fe, oldest U.S. state capital, thence to Albuquerque. As mission bells toll 7:00 P.M., your train pauses for 45 minutes, permitting a stroll around the adjacent Spanish style hotel and a visit to its museum annex housing an extensive collection of Indian relics.

In the gathering twilight, you'll ride through pueblo land abounding in centuries-old cliff dwellings. Then a Fred Harvey dinner and early to bed, for tomorrow's the thrill of a lifetime—breath-taking Grand Canyon in Arizona.

The tour starts with breakfast at El Tovar Hotel, followed by a motor trip westward along the brink of the chasm, with stops at observation posts and lectures by National Parks personnel. The afternoon coach route is eastward through Kaibab National Forest and beside the canyon's rim. Sunset over the 217-mile long, mile-deep gorge is unforgettable. Meals for the day are included the round-trip railroad excursion fare.

Your last night aboard the air-conditioned special takes you across the desert, into California and, by Sunday noon, to journey's end—glamorous Los Angeles. Until Monday morning, you're free to explore the town, see Hollywood night life, beaches, Chinatown, and other attractions.

Registration at Hotel Biltmore, convention headquarters, precedes an all-day plant tour to a large aircraft factory (barring security restrictions), including a visit to Los Angeles Habor and Signal Hill. A lecture, "Aircraft Development and Jet Propulsion," by Hall Hibbard, Vice-Pres. and Chief Eng., Lockheed Aircraft Corp., constitutes the evening technical session.

Tuesday morning another day-long plant trip will proceed through California

Left: Resembling a snow-banked forest, this gigantic stalagmite in Carlsbad Caverns has been forming for at least 50 million years. Members from the Southwest may visit this natural wonder en route to California. Right: A Mexican sales girl tempts passersby with pottery from her shop on Olvera Street, oldest thoroughfare in Los Angeles

countryside and orange groves to the Kaiser Steel plant. "Petroleum Industry — Cooling, Refining" is the subject of a technical meeting at 8:00 P.M.

Highlight of every tourist's program, the engineering of Hollywood film productions, will be observed all day Wednesday at the 20th Century-Fox lot. Lunching at the company cafeteria, you may rub elbows with your favorite flicker cutie.

Optional afternoon plant tours available over the three days include: U.S. Steel Products, American Can Co., U.S. Electric Motors Co., Alcoa, Firestone Tire and Rubber Co., and Owens-Illinois Glass Co.

Principal address at the banquet, Wednesday evening, will be given by Henry J. Kaiser, phenomenal industrialist of wartime renown. Toastmaster will be Edward Arnold of film and radio fame. A reception will precede the dinner and the function will conclude with a floor show and dancing.

In cars provided by the Reception Committee, wives of local committeemen will drive the visiting ladies on sightseeing tours, covering radio broadcasts, Wilshire Boulevard shopping along fabulous "Miracle Mile," Huntington Library, the Last Supper wndow at Forest Lawn Cemetery, Mexican quarter, Chinatown, City Hall, San Gabriel Mission, and Exposition Park Museum, with luncheon at the celebrated Brown Derby.

In addition, efforts are being made to present a fashion show and a Radio City tour for the first two evenings.

If you haven't already accepted Los Angeles' invitation to travel, fun and business, tear out the blue, inquiry post card from the May *Tool Engineer* and rush it off today. Opportunity like this won't knock twice!

From top: Roosevelt Highway follows this sweep of beach along the Pacific shore; Wilshire Boulevard makes a graceful swing as it crosses Westlake Park in Los Angeles; pausing in their descent, Grand Canyon trail riders gaze at the magnificent panorama; one of the scenic wonders of the world, Grand Canyon records eons of geological history in the strata of erosion-truncated rocks.

Below: The beauty and quiet of Mirror Lake in Yosemite National Park, California, invite reverie. Photos, Santa Fe Railway and Los Angeles Chamber of Commerce

Los Angeles Convention Committees Meet to Plan Program

Representatives of the National Program Committee met with local convention committees, April 29, at Rodger Young Auditorium in Los Angeles to draft program for Semi-Annual Meeting in California city next October. At end table, from left, are: Howard Windsor, Detroit office secretary to the National Program Committee; E. W. Baumgardner, National Program Chairman; Leslie Hawes, General Chairman of the Host Chapter Committee; F. J. Schmitt, First Vice-Chairman, and A. D. Lewis, Los Angeles member of National Program Committee. Table at left, outside, from left: G. F. Berneli, A. H. Bawlzer, R. G. Stronks, C. L. Wight and H. F. Miller; inside, S. R. Hirsch, G. B. Stevens, R. H. Powroznik, R. H. Kollenborn and M. W. Seavey. Right table, inside: Anton Peck, Rudolf Regen, P. R. Burt, J. A. Parks, O. F. de Castro, G. F. Grimm, G. R. Bennett and J. E. Ekstromer; outside, from foreground: Louis Nanchy, Wayne Ewing, H. S. Bamberger, S. H. Parsons, Jr., R. R. Linch and G. J. Walkey, all of Host Chapter. Jointly they developed the well-rounded program outlined on the two preceding pages.

Weaver Credits U. S. Wealth to Freedom of Action

Pittsburgh, Pa.—America enjoys the highest standard of living because its people have applied their energies more effectively in creating wealth from natural resources than any nation in the world through all time.

Why? Because here men are free to live their own lives, spend their own money, try out new things in the never ending search to explore all the byways that may lead to progress, asserted Henry Grady Weaver, Director, Customer Research Staff, General Motors Corp., speaking before Pittsburgh Chapter at a dinner meeting April 2 in Fort Pitt Hotel.

Waste Is Price of Progress

Freedom of choice, he admits, results in waste, which is the price of progress, but, "You don't have to hit the jackpot more than once in about a thousand times to more than balance the score."

The big contrast between America and other countries, according to Mr. Weaver, is that while the latter are less wasteful of material things, they are profligate in squandering the tremendous potentiality of individual initiative—the mainspring of all human progress.

Highly significant of free minds, he believes, is the fact that many of our revolutionary leaders were inventors, such as Benjamin Franklin who laid the foundation for the electrical industry, invented bifocal spectacles, the rocking chair, and the prototype of the modern baseburner; Thomas Paine, who designed the first, single-span iron bridge with criss-cross girders; and Thomas Jefferson, supporter of Eli Whitney and inventor of one of the first scientifically curved mold boards for a plow.

But the greatest of all inventions was the creation of an entirely new form of political structure in complete reversal of old world precedents, "based on a principle as inexorable as any basic law of physics . . . that each individual is in control of his own life energy and that human initiative and creative ability spring from within and simply cannot be forced from without."

While the United States is far from perfect, Mr. Weaver brought home to his listeners, "when we imagine that a short-cut to the millenium lies in the direction of substituting governmental control and centralized authority in the place of self-reliance and individual responsibility, we are falling into the ancient old world delusion which, for over 6,000 years, has stagnated human progress and kept the vast majority of people underfed, underclothed, embroiled in wars and surrounded by famine and pestilence."

Mr. Weaver's talk was a digest of his recently published book, "Mainspring."

First Vice-Chairman Frank Boyd introduced the speaker and Delegate Paul H. Magnus reported on the recent annual convention in Cleveland.

It's Westward Ho to Los Angeles with ASTE, October 11-12-13

Westinghouse Group Plans Society Affiliation

Pittsburgh, Pa. — Approximately 100 Westinghouse tool engineer apprentice graduates met at the East Pittsburgh plant, May 5, to hear an address by C. V. Briner, former ASTE President, concerning Society aims and objectives.

Following Mr. Briner's talk, there was discussion pertinent to organization of a Westinghouse group to be affiliated with Pittsburgh Chapter.

T. I. Phillips, Westinghouse Vice-President, who is conducting the organization of the group, and H. E. Conrad, ASTE Executive Secretary from the Detroit office, also spoke.

Mr. Briner presented Mr. Phillips with his membership card and pin.

ASTE representatives included W. B. Peirce, immediate Past President; W. S. Risser, Pittsburgh Chapter Chairman; and other local officers.

Other News In This Issue

ASTE National Chairmen Name Committee Members

Personnel of ASTE National Committees for 1948-49 is now complete, with appointments embracing wide Chapter representation.

National Committee Chairmen, named by President I. F. Holland, have chosen their committeemen as follows:

Constitution and By-Laws: Richard R. Linch, Los Angeles Chapter, Chairman; Edward J. Berry, Little Rhody; and Edward H. Ruder, St. Louis.

Editorial: Frank W. Curtis, Springfield, Mass., Chairman; Ben C. Brosheer, and Frank Martindell, Chicago; Guy Hubbard, Cleveland; Kenneth C. Jasper, Louisville; and Michael J. Radecki, New Haven.

Education: Halsey F. Owen, Indianapolis, Chairman; Jay N. Edmondson, Columbus; Charles C. Gorham, Boston; Sherman B. Hagberg, Rochester; and C. Douglas Wright, Niagara District.

Finance: George C. Johnson, Rockford, Chairman; John L. Webster, Northern New Jersey, Vice-Chairman; George A. Goodwin, Dayton; Harry R. Nelson, Chicago; Louis L. Weber, Cincinnati; and Roger Waindle, Fox River Valley.

Handbook: E. W. Ernst, Schenectady, Chairman; Frank W. Curtis, Springfield, Mass., Vice-Chairman; Ben C. Brosheer and Frank Martindell, Chicago; Harry Crump, Detroit; R. B. Douglas, Montreal; Adrian L. Potter, Springfield, Mass.; and Frank W. Wilson, Editor.

Judicial-Honor Awards: Joseph A. Siegel, Detroit, Chairman; T. B. Carpenter, Frank A. Shuler, William H. Smila and Walter F. Wagner, Detroit; Frank W. Curtis and James R. Weaver, Springfield, Mass.; Robert M. Lippard, Worcester; and A. H. d'Arcambal, Hartford.

Membership: Fred J. Dawless, New Haven, Chairman; W. W. Appleton, Toronto, Vice-Chairman; Herbert A. Bachman, Detroit; George A. Exley, Baltimore; Val G. Kessler, Toledo; James O. Knight, Peoria; C. John Lindegren, Worcester; and Howard F. Volz, Columbus.

Program: E. W. Baumgardner, Cleveland, Chairman; F. J. Schmitt, Chicago, Vice-Chairman; G. A. Rogers, Montreal, Second Vice-Chairman; James O. Horne, Rochester; A. D. Lewis, Los Angeles; A. A. Nichols, Boston; and Gardner Young, Pittsburgh.

Public Relations: Harry B. Osborn, Jr., Cleveland, Chairman; H. E. Campbell, Cincinnati; R. Eric Crawford, Toronto; W. J. Gamble, Buffalo-Niagara Frontier; Leslie F. Hawes, Los Angeles; Charles O. Herb, Northern New Jersey; W. F. Sherman, Detroit; Harry H. Whitehall, Hamilton; Carl Harrington, Greater New York, and Guy Hubbard, Cleveland.

Standards: L. B. Bellamy, Detroit, Chairman; E. J. Marasko, Cleveland, Vice Chairman; William Moreland, Rockford; Raymond C. Peterson, Toledo, W. A. Thomas, Windsor; and Grant S. Wilcox, Jr., Detroit.

Professional Engineering: W. A. Dawson, Chairman; and Housing: A. M. Sargent, Chairman.

These committees, directing the various departments of Society activity, have already organized and initiated their programs for the year. Under current budgetary restrictions, they will have fewer traveling members than previously.

J. A. Siegel

F. W. Curtis

E. W. Ernst

H. F. Owen

F. J. Dawless

L. B. Bellamy

R. R. Linch

G. C. Johnson

E. W. Baumgardner

A. M. Sargent

W. A. Dawson

H. B. Osborn, Jr.

Well Tooled Automatics Raise Quality, Cut Costs

Elmira, N. Y.—Robert Rhodehamel, General Sales Manager of the National Acme Co., Cleveland, Ohio, was the featured speaker at the May 3 dinner meeting of Elmira Chapter. His subject, "Tooling Multiple Spindle Automatics—and How," was highly educational.

The speaker demonstrated machines and tooling methods for simple and for complicated parts, completed in one set-up on multiple spindle automatics. Correct tooling of these machines, as outlined, can "raise quality, improve product, and reduce cost." At the conclusion of his talk, Mr. Rhodehamel answered many questions from the floor.

Chairman James F. Deegan presided and welcomed the group. Visitors included a delegation of 35 from Binghamton Chapter among the attendance of 80.

First Vice Chairman Patrick G. Pecoraro introduced the speaker.

Announcement was made of the annual outing to be held in August. President I. F. Holland of Hartford, Conn., is expected to be present.

Varner T. MacRorie, Southside High School instructor, reviewed three worthwhile engineering books as part of the educational program.

It was reported that Harry Rice and members of the Education Committee were issuing announcements to area high schools concerning the Chapter's student contest in Tool Design. Prizes will be awarded at the first fall meeting, September 13.

Opens Consulting Office

Bridgeport, Conn.—C. Carl Curtis, who retired from Casco Products Corp. a year ago, has opened Curtis Engineering Co., a new Bridgeport consulting service.

During most of his 18 years with Casco, Mr. Curtis served as Master Mechanic in charge of tool design, methods and process. He is affiliated with Fairfield County Chapter, ASTE.

The new firm offers consultation and design service on molds, dies, fixtures, and special machinery.

Stachel Joins Wells

Elmira, N. Y.—Edward Stachel, Past Chairman of Elmira Chapter, has joined the Wells Supply Co., in the capacity of industrial engineer.

He was formerly Supervisor of Machine Shop and Tool Room at Ward La-France Truck Corp.

Gear Tooth Design Talk Stresses Form, Action

Philadelphia, Pa.—The action of mating gear tooth profiles to transmit motion at uniform angular velocity, a frequently neglected phase of gear design, was discussed by A. Zamis, Chief Design Engineer, Illinois Tool Works, Chicago, Ill., in a recent lecture before Philadelphia Chapter.

First problem facing the designer, said Mr. Zamis, is selection of pitch, often determined from one of the widely published strength formulas. An alternative method is to choose a pitch by comparison with a similar existing application, thus profiting by experience.

Tooth Profiles Described

Turning to tooth profiles, the speaker described involute, 20°, standard, round bottom, and long and short addendum gears, their action and detailed design. Shaved, ground, curved, helical and spur gears also were included in the treatise.

As good gear performance is the result of careful design and production accuracy, errors in runout, involute profile, spacing and lead must not be greater than the particular gear application can tolerate, he cautioned. Slides illustrated the high points of the talk.

Swan Bjornberg of the same company assisted Mr. Zamis and touched on carbide hobs and involute splines during the question and answer period.

Arthur Diamond, retiring Chairman, announced the re-election of Thomas J. Donovan, Jr., as National Director and introduced the 1948 officers who were then sworn in by Mr. Donovan.

Samuel R. Boyer, newly-inducted Chairman, accepted the gavel from his predecessor and expressed his appreciation of the honor conferred on him. Mr. Boyer presented a Past Chairman pin to Mr. Diamond, as well as a traveling bag on behalf of officers and committeemen in the latter's administration.

The new committee chairmen were introduced by Chairman Boyer.

Emil Kittman, First Vice-Chairman, announced interesting program commitments and received reports from Frank DeFrates of the Finance Committee and from John McMonagle, Chapter Delegate.

Guests, among the attendance of 90, included F. J. Anibal of Pontiac Chapter and William Batterslby, one of the 11 founders of Philadelphia Chapter.

Gives Engine Talk

Williamsport, Pa.—The Lycoming 3000-hp engine was described by John M. Carpenter, Project Engineer, Avco Manufacturing Corp., for Williamsport members and their guests attending a Chapter dinner meeting, April 12, in the Lycoming Hotel.

George Estep, Chapter Delegate, reported on the recent House of Delegates meeting and national convention at Cleveland.

Visitors included National Director Thomas J. Donovan, Jr., of Philadelphia, who spoke on Chapter expansion.

Burton Stuart of Raytheon Mfg. Co. demonstrates packaged electronic control set up on lathe for Boston members during recent Chapter symposium on electronics.

Arthur Diamond (left), retiring Chairman of Philadelphia Chapter, smiles his appreciation of luggage presented by Samuel Boyer on behalf of officers and committeemen serving during Mr. Diamond's administration.

Sees Die Improvement In Closer Cooperation

Buffalo, N. Y.—Possibility of definite improvement in the design and die life through cooperation between designer and hardener was brought home to Buffalo-Niagara Frontier members attending a Chapter technical session April 14 at the Buffalo Trap and Field Club.

The subject, "Analysis of Shortcomings of Designers and Hardeners," was presented by A. G. Shepherd, Jr., Chief Metallurgist, Taft-Peirce Mfg. Co., Woonsocket, R. I. Particularly enlightening to junior members, the talk was delivered in terms easily understood by those with limited experience.

Attendance represented 75% of the membership and 17 guests. During the dinner hour the group participated in a "Tool Klinic."

Latrobe Promotes Press

Toledo, Ohio—John E. Press, Toledo Chapter Secretary for the past year, is now in charge of the local office of Latrobe Electric Steel Co.

Mr. Press has been connected with the Latrobe Toledo office for the past five years, following an association with Firestone Tire and Rubber Co.

Herbert Austin, another Toledo member, has joined the Latrobe sales force. Previously he was with Peerless Tool Co. and A. M. Schmit Co.

Electronics Symposium Demonstrates Economies

Boston, Mass.—"Electronic Equipment for Machine Tools" was described and demonstrated for 180 members and guests of Boston Chapter by Frank H. Penney, Industrial Engineering Div., General Electric Co., Schenectady, N. Y.; Burton Stuart, Raytheon Mfg. Co., Waltham, and Donald R. Percival, President, Machine Electrification, Inc., Worcester, during a meeting April 15 in New England Mutual Hall.

General Electric's applications in this field, along with factual data on performance of machines now in production, were discussed and illustrated by Mr. Penney.

Through the cooperation of Packard Machine Co., local lathe distributors, Mr. Stuart set up and operated the newest, packaged electronic control produced by Raytheon. The unit was mounted on a stock model South Bend lathe in less than an hour, including all wiring and checking.

Using the Servotron Duplicator, he machined a part to .001" tolerance for shoulders and peripheral shape.

Mr. Percival related his experiences in installing electronic controls, their advantages and limitations. He cited the need for more skilled service men to furnish maintenance on such applications, further indicating that there can be little foreign market for electronic devices until good maintenance men are available abroad.

Electronic controls, the speakers emphasized, lower production costs through increased speed and the utilization of less skilled machine operators.

Continued operation of the electronically-controlled lathe after the meeting commanded widespread interest among the audience.

Executives Honor Holland At New Britain Night

Says Carbide Not Panacea Solves Special Problems

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Herbert Austin, another Toledo member, has joined the Latrobe sales force. Previously he was with Peerless Tool Co. and A. M. Schmit Co.

Electronics Symposium Demonstrates Economies

Boston, Mass.—"Electronic Equipment for Machine Tools" was described and demonstrated for 180 members and guests of Boston Chapter, by Frank H. Penney, Industrial Engineering Div., General Electric Co., Schenectady, N. Y.; Burton Stuart, Raytheon Mfg. Co., Waltham; and Donald R. Percival, President, Machine Electrification, Inc., Worcester, during a meeting April 15 in New England Mutual Hall.

General Electric's applications in this field, along with factual data on performance of machines now in production, were discussed and illustrated by Mr. Penney.

Through the cooperation of Packard Machine Co., local lathe distributors, Mr. Stuart set up and operated the newest, packaged electronic control produced by Raytheon. The unit was mounted on a stock model South Bend lathe in less than an hour, including all wiring and chucking.

Using the Servitron Duplicator, he machined a part to .001" tolerance for shoulders and peripheral shape.

Mr. Percival related his experiences in installing electronic controls, their advantages and limitations. He cited the need for more skilled service men to furnish maintenance on such applications, further indicating that there can be little foreign market for electronic devices until good maintenance men are available abroad.

Electronic controls, the speakers emphasized, lower production costs through increased speed and the utilization of less skilled machine operators.

Continued operation of the electronically-controlled lathe after the meeting commanded widespread interest among the audience.

Forum Speakers Discuss Plant Standards Systems

Cleveland, Ohio—An open forum, conducted April 23 by Cleveland Chapter Standards Committee, was attended by members of the Chapter and of Cleveland Technical Societies Council, as well as visitors from Cleveland, Detroit and Chicago.

The meeting was in connection with the Chapter's $200 prize contest for a thesis on "An Overall Standards System." Deadline for the competition has been extended to December 31, 1948.

The speakers' panel was composed of four prominent industrial engineers. George Trundle of Trundle Engineering Co., D. A. Sunderlin of the Sunderlin organization, Howard D. Strong and H. N. Narovec of Strong & Narovec Co.

Management tools, such as operators, time study, supervision and other factors, each operating under its own standards, were pointed out by Mr. Sunderlin. He also compared measured time with time study.

Mr. Trundle advocated "synthetic standards" in place of time study as a basis of computation for the engineer in designing a required tool.

A standard was defined as an accepted measure or basis of comparison by Mr. Strong, while Mr. Narovec stated that controls are the standards.

Planning Reduces Waste

All speakers agreed that reasonable forethought in every phase of industrial production can eliminate most waste. In addition to the various standards systems in practice, competition was named as a standard in that it is a target.

The speakers were plied with questions from the floor which were capably answered.

Herbert Berg, Chairman of the Special Activities Sub-Committee, was in charge of the forum.

Reorganized under the direction of Second Vice-Chairman E. J. Marasko, the Standards Committee has three subcommittees. W. L. Donahue, Chairman, will continue to head its participation in formulation of standards. The Data Sheet Sub-Committee will endeavor to secure data sheet suppliers. They will be assisted by the Special Activities Sub-Committee, who will also conduct forums and tool quizzes. T. J. Gruss is Secretary of the latter committee.

* * *

F. A. Bodenheim, Sales Engineering Manager for Federal Machine and Welder Co., addressed the Chapter April 9 on the subject, "Tooling for Resistance Welding." His presentation was illustrated with a Technicolor film and evoked great interest.

Capt. Arthur Roth of the Safety Div., Cleveland Police Dept., spoke on "Traffic Safety and Accident Prevention." Slides showing accidents and their causes brought home the necessity for careful driving.

To Get Aboard That Special Train for the Los Angeles convention, return the prepaid post card from the May *Tool Engineer*.

Executives Honor Holland At New Britain Night

Hartford, Conn.—Some 300 engineers and industrialists attending the Fourth Annual New Britain Night, co-sponsored by Hartford Chapter and the New Britain Industrial Council, honored I. F. Holland General Superintendent, Small Tool and Gage Dept., Pratt & Whitney, Div. Niles-Bement-Pond Co., on his election to the presidency of ASTE. The testimonial dinner was held April 5 at The Hedges, New Britain.

A feature of the event was the presentation of a silver cocktail set to Mr. Holland by William H. Jarvis, Chapter Chairman and master of ceremonies for the occasion. Mr. Holland responded, commenting briefly on advances made by the Society and the cooperation of his fellow officers and committeemen.

Principal speaker was A. M. Sargent, President and General Manager, Pioneer Engineering and Manufacturing Co., Detroit, and a former Society President, who discussed "Automotive Production Tooling."

Main objective of the mass production system, he said, is to keep products moving without delay, by synchronizing manufacturing facilities so that there will be no production holdup to interfere with the assembly schedule.

Also described were basic tooling and engineering design, materials, fabricating in the least possible time, and the role of the project engineer, time study and other departments.

Executives introduced included Stanley T. Goss, Pres., and Harry J. Hauck, Vice-Pres. and Chief Eng., Goss & Deleeuw Machine Co.; Sigurd P. Morgen, Factory Mgr., P.&F. Corbin Co.; Arthur E. Thornton, Pres., and Joseph Balciunas, Eng., Skinner Chuck Co.; Stanley Hart, Pres., Tuttle & Bailey, Inc.; Earl V. Higbee, Supt., Stanley Tools Div.; and John Ahearn, Manufacturers Association of Connecticut.

Ray H. Morris of West Hartford, another ASTE Past President, was toastmaster. Other former presidents attending the affair were James R. Weaver of Springfield, Mass., and A. H. d'Arcambal of Hartford.

Right: I. F. Holland (left), ASTE President, receives gift in honor of his election, at Fourth Annual New Britain Night. Presentation was made by W. H. Jarvis, (center), Hartford Chairman. Ray H. Morris (right), a former president, adds his congratulations. Below: Four past presidents attend function honoring Mr. Holland. Standing, from left: Mr. Morris of Hartford; Mr. Jarvis; A. H. d'Arcambal, Hartford; and Joseph Balciunas, Entertainment Chairman. Seated: James R. Weaver, Springfield, Mass.; Mr. Holland, and A. M. Sargent, Detroit, Mich., who was also principal speaker.

Says Carbide Not Panacea Solves Special Problems

Columbus, Ohio—Carbide is not an engineering cure-all, but is used for metal cutting problems which seemingly have no solution, Donald E. Oberg, Carbide Die Engineer, Allegheny Ludlum Steel Corp., pointed out to Columbus Chapter members during a talk, "Carbide Dies and Wear Parts." Mr. Oberg was the technical speaker at a meeting April 14 in the Fort Hayes Hotel.

Carbide dies and parts described were well illustrated with slides showing details. Examples included dies for soap making and for manufacturing BX cable, and lamination dies used in electric motors.

A sound film, "The Manufacture of Carmet," supplemented the lecture. In the ensuing discussion period, Mr. Oberg answered questions concerning clearances, sizes, costs, grades and special uses of the metal. Actual parts and dies were displayed.

Evansville Chapter joins with the Evansville Section of ASRE, and the Evansville Scientec Club in presenting electronics program, as approximately 400 members of the three groups attend dinner meeting, and technical session sponsored by Westinghouse Electric Corp.

Technical Societies Join In Electronics Program

Evansville, Ind.—Evansville Chapter, ASTE, Evansville Section of ASRE, and the Evansville Scientec Club held their first joint meeting April 9 at Hotel McCurdy with an attendance of approximately 400.

Hal Toner, Electronics Sales Engineer for Westinghouse Electric Corp., Pittsburgh, presented his company's two-hour "packaged show" on electronic heat. Built around a Technicolor sound film, "RF Heating," and a series of slides, the program was augmented with explanations by Mr. Toner.

His subject, which has recently sprung into a position of major industrial prominence, covered induction heating for soldering, brazing, annealing and hardening; dielectric heating for preheating plastic preforms, wood gluing, curing and drying of rubber, and other applications. An open forum followed the show.

Fairfield County Group Visits Bullard Plant

Bridgeport, Conn.—April meeting of Fairfield County Chapter was held at the Bullard Co. on the 7th.

Following dinner in the company cafeteria, E. C. Bullard, President of the firm, welcomed the visitors.

Frank U. Hayes, Sales Manager, discussed "Machine Tools in Industry." A sound film supplemented his address.

After the lecture the members were conducted through the plant by Bullard foremen. The many machines in operation provided an unusual opportunity to see large scale manufacturing of heavy production equipment.

There's Pleasure and Profit, Too Waiting in Los Angeles for you.

Speed, Economy Claimed For Crush Dressing

Los Angeles, Calif.—Advantages of crush dressing abrasive wheels are six-fold, according to J. T. Welch, Manager, Machine Tool Sales Div., The Sheffield Corp., Dayton, Ohio.

Speaking before Los Angeles Chapter, April 8, on "New and Recently Developed Methods of Crush Grinding," Mr. Welch enumerated benefits as: (1) better cutting surface with more sharp cutting points; (2) increase in number of pieces ground per dressing; (3) wheel is formed to desired shape in fraction of time required for other methods, even on most varied of profiles; (4) cost of dressing wheels is greatly reduced through greater production per dressing and the large number of dressings possible; (5) longer wheel life, as only the dulled grits need be removed; and (6) reduction of hazard of burning, and of pressure required to remove stock.

Crushing, the speaker described as a method of shaping or conditioning a grinding wheel by means of a roller on which the desired profile has been established.

His explanation of the procedure was accompanied by slide illustrations of the operation and its applications.

Officers installed during the meeting are: L. F. Hawes, Chairman; Harvey Groehn, First Vice-Chairman; G. J. Walkey, Second Vice-Chairman; J. A. Parks, Secretary; Rudolph Powroznik, Treasurer; Anton Peck, Delegate; and Arthur Lewis, Alternate.

Mr. Hawes, a member of the Exposition Committee, reported on the big tool show at Cleveland, and Mr. Peck gave an account of the House of Delegates meeting there.

John Lafferty was announced as the 1948 Standards Chairman.

"One silver dollar for the gentleman" awards "Prof. I. Q." T. J. Donovan Jr. ASTE Director and head of Donovan Heat Treating Co. Philadelphia where he was recent host to 100 members of ASTE-sponsord classes at Spring Garden Institute. Mr. Donovan conducted technical quiz program for student tool, jig, fixture and die designers

Tool Design Students See Heat Treat Demonstration

Philadelphia, Pa.—Thomas J. Donovan, National Director, acted as host and teacher to 100 students of the Philadelphia ASTE-sponsored classes in Tool, Jig, Fixture and Die Design of Spring Garden Institute, who visited the Donovan Heat Treating Co., April 16.

Demonstrations of heat treating included pack hardening, carburizing, nitriding, oil and water hardening. Techniques of quenching, types of surface finishes and furnace control equipment were explained. After each demonstration there was a question and answer period concerning the operation.

A quiz program was conducted by Mr. Donovan. Those answering correctly were awarded silver dollars.

Clint Mitchell, Chief Metallurgist of Coleman Testing Laboratories, assisted Mr. Donovan and explained how die failures are analyzed. He covered etch testing, poor design factors which cause heat treating failures, steel and heat treatment determination methods.

Following the interesting program, refreshments were served.

Attendance included Samuel Boyer, Chairman; Byron Gates, Secretary; and James F. Barnes, Editorial Chairman, Philadelphia Chapter; John Noble, William Weishapt and Robert Robson, teachers at the Institute.

Toledo Men in New Posts

Toledo, Ohio—Arthur Bok, for the past 12 years Chief Engineer at Kent-Owens Machine Co., has purchased a small metal production shop at Fort Wayne, Ind.

Lawrence Rothert of the General Research Div., Owens-Illinois Glass Co., has returned to Kent-Owens as Director of Engineering of the Machine Tool Div. to assume some of Mr. Bok's former duties. Mr. Rothert was previously associated with this division from 1936 to 1947.

Mr. Bok is a charter member, former Chairman, Delegate and committeeman of Toledo Chapter, ASTE, and Mr. Rothert is the incumbent Chairman.

"October's Bright Blue Weather" Calls you to sunny California.

Dinner at Whitin Machine Works was part of the tour and technical session held by Worcester Chapter at the big textile machinery plant. At speakers' table, from left, are: Eric Pierson, Works Manager at Whitin; Carroll L. Morse, Chapter Second Vice-Chairman; Stilman Hyde, Development Engineer, Whitin; Harold F. Thompson, Chapter Treasurer; R. E. Lincoln, Vice-President in Charge of Purchasing, Whitin; V. H. Ericson, Third Vice-President, ASTE; J. H. Bolton, President, Whitin; Robert B. Parker, Chairman, Little Rhody Chapter; Ralph E. Rawlings, Chairman, Worcester Chapter; A. Dudley Bach, President, New England Metallurgical Co., Boston, technical speaker; Carl D. Schofield, Chapter Vice-Chairman; John Cunningham, General Superintendent, Whitin; George Estes, Indus. Eng., Whitin; and Ralph Baker, Chapter Secy.

Textile Machinery Plant Viewed by ASTE-ASM

Worcester, Mass.—A "merry-go-round" foundry capable of pouring 120 tons per day, forge shop, complete power plant, machine shop, and erecting floor highlighted a recent visit of some 175 Worcester ASTE and ASM members to one of the largest textile machinery plants in the country.

The afternoon trip through the Whitin Machine Works at Whitinsville gave the group opportunity to see textile machinery in operation and to inspect one of the most extensive self-contained plants in the area.

Following the factory tour, the visitors assembled in the plant cafeteria for dinner and a joint technical session of the two societies.

A. Dudley Bach of the New England Metallurgical Co., Boston, discussed "Selection of Steels Before Heat Treating," and S. B. Hyde of the host plant spoke on "Woolen Machinery and Its Operation." A technicolor film describing wool processing augmented Mr. Hyde's address.

J. H. Bolton, company president, briefly reviewed the history of the Whitin organization.

Tells Trends in Tooling

Racine, Wis.—"Trends in Tooling" are toward automatic machinery, William W. Barton, President, W. F. & John Barnes Co., emphasized in a film illustrated address, April 5, before Racine Chapter.

With proper gages and modern means, Mr. Barton indicated, tools can be ground to perform a special function, tending toward automatic machines requiring minimum effort from the operator and delivering maximum production.

In the experience of the Barnes Company, if a machine can save labor and increase output, manufacturers will install it and discard earlier equipment.

Through such modernization, the manufacturer, wholesaler, dealer, consumer, and worker all benefit, the speaker pointed out.

You'll See Beauteous Babes in a special, Hollywood studio tour planned for the ASTE convention.

12-Machine Installation Operated by One Workman

Rochester, N. Y.—Clare Bryan, Consulting Tool Engineer of Link-Belt Co., Chicago, and a former Chairman of the ASTE Chapter there, appeared before Rochester Chapter April 5, discussing "Practical Tool Engineering of Jigs and Fixtures with Hydraulic Applications."

The meeting of 135 members and guests at Rochester Institute of Technology was preceded by dinner in the Colony Restaurant.

Using some 60 slides, Mr. Bryan showed equipment recently installed in company plants making such diversified products as material handling and power transmission machinery, steel and malleable iron conveyor chain, as well as ball and roller bearings.

Before a project is undertaken, he explained, a planning committee studies methods, tooling, cost of operation, and special machinery involved.

Highlighting Mr. Bryan's talk was his description of a set of 12 machines costing $200,000, all operated by one switch. The part being machined is located and held by hydraulic application and controlled by a push-button. One operator runs the entire setup.

Following the lecture, the speaker conducted a lively question and answer period.

Chairman H. O. Simon presided and First Vice-Chairman W. R. Gordon presented the speaker.

M. L. Roessel, J. O. Horne and R. T. Barnett reported on the national convention at Cleveland, attended by 60 local members.

* * *

Seventy or more couples attended the Fourth Annual Ladies Night and Dinner Dance, held April 3 in the Starlight Roof of the Sheraton Hotel.

Toastmaster for the occasion was Third Vice-Chairman J. O. Horne. "Doc" Vitale entertained with a series of clever acts billed as "Pantomine in Magic."

"New Look" plastic earrings of varied colors and designs were presented to the ladies. Some of the more fortunate also won matching necklaces.

The entertainment was followed by dancing to the music of "Vic Sweet" at the twin keyboards of piano and solo vox, and his orchestra. Tables were available for those wishing to play cards.

The party was arranged by Entertainment Chairman Ernest Straw and his committee.

Muehlbauer Named Supt.

Evansville, Ind.—Herman J. Muehlbauer has joined Ken Standard Corp. as General Superintendent, according to Clyde E. Yost, President.

Mr. Muehlbauer's new association follows 16 years with Seeger Refrigerator Co. where he was Superintendent of the Machine Division.

He is Vice-Chairman of Evansville Chapter, ASTE, and a member of the American Society of Refrigeration Engineers.

Left: Clare Bryan of Link-Belt Co. tells Rochester Chapter how hydraulic applications implement tooling. Right: Herbert O. Simon, Rochester Chairman, steals the mike from Toastmaster James O. Horne for an extemporaneous announcement during Ladies Night program. From left: Mrs. Simon, Milton Roessel, Past Chairman; Mrs. Roessel, Mr. Simon and Mr. Horne, Third Vice-Chairman; Mrs. Horne, Ernest G. Straw, Entertainment Chairman; and Mrs. Straw.

Top: Visiting British Gauge and Tool Makers' Association members were recent guests of Cincinnati Milling & Grinding Machines, Inc. From left, back row: C. G. Grundy, and Hans Ernst, John Tangeman, John Gross, Nelson Caldwell of the Cincinnati staff; third row: J. V. Murcott, H. G. Brown, G. F. Clark; George Squibb of the host group, and A. C. King; second row: A. C. Bishop, A. R. Betteridge, G. J. Shaffer and William Taylor; front row: J. Goulder, H. Holder, Robert McArd, E. Slater, Acting Chm.; G. T. Beech, Secy.; A. Enticknap and N. Rolaston. Below: Dancing gets under way at Toronto Chapter's annual Ladies Night, attended by nearly 500 members and their guests.

British Tool, Gauge Men Enjoy ASTE Hospitality

The recent American tour of a delegation of the British Gauge and Tool Makers' Association was facilitated through cooperation and courtesies extended by ASTE Chapters in the various cities visited, according to a communication received by Harry E. Conrad, ASTE Executive Secretary, from Gilbert T. Beach, Secretary of the English organization.

In expressing the appreciation of the group, Mr. Beach says:

> My first, very real pleasure on landing safely back in England is to write and thank you very much indeed for the immense amount of time and trouble taken to make our short visit to the United States not only exceedingly profitable, but also so tremendously interesting and enjoyable.
>
> The Members of the Association party were unanimous in voting the tour a great success in every possible way, thanks to the invaluable help and cooperation of yourself and your colleagues; and I would assure you that we have returned to Britain with feelings of friendship and affection for the American people even stronger than they were before.
>
> I do hope you will convey to the Officers and Committee Members of the Chapters, in the various cities at which we called, our sincere appreciation of their generous interest and assistance. And my only hope is that, in the not too distant future, your Society will consider a similar trip to England. That will provide our Association with an opportunity of endeavouring to reciprocate your exceptional hospitality.

Primary objective of the trip was a visit to the ASTE Exposition in Cleveland. The British group was met at the railroad station by a party of ASTE National Officers. E. Slater, acting Chairman of the group, appeared on a Cleveland radio newscast arranged by the ASTE Public Relations Department.

At Hartford, Conn., the visitors inspected the Pratt & Whitney plant, had tea with ASTE President I. F. Holland and former President A. H. d'Arcambal, both P & W executives, and were entertained at dinner by the company.

Several Detroit members, headed by George Bush, Education Chairman, met the English visitors at their hotel and escorted them through a number of plants. Others in the host party were Andrew Carnegie, Chapter Chairman; Robert Gibbs and Edward Wiard.

First plant visited was Eclipse Counterbore where Mr. Bush is an engineer. Here interest centered around induction heating, Zyglo inspection, and quick change tools.

R. W. Chadwick, Sales Manager conducted the party through the N. A. Woodworth Co. where everything connected with gage making came in for close attention.

The sintering process at Allegheny Ludlum's carbide division also fascinated the overseas guests.

All of the Detroit companies holding open house to the Association joined as luncheon hosts at the beautiful Rackham Memorial, home of the Engineering Society of Detroit. During an inspection tour of the building, the foreign production men became intrigued with indoor bowling, a sport unknown in England. They finally tore themselves away from this diversion in time to visit the Gorham Tool Co. Mr. Wiard, who is Works Manager, escorted them through the plant, where they were particularly impressed by methods used in mass production of tools.

For their day in Cincinnati, they were guests of Cincinnati Milling and Grinding Machines, Inc., beginning with breakfast at Hotel Gibson. At the factory they were welcomed by Carl Roby, Vice-President, and taken on an extensive tour of the foundry and other buildings, under the guidance of Nelson Caldwell, Export Manager, Hans Ernst, Head of Research; George Squibb, John Tangeman, John Gross and William Taylor of the Field Service Department.

Their Canadian itinerary included visits to A. C. Wickman Co. (Canada), Peerless Engineering, and Modern Tool Works, Toronto; and Northern Electric Co., Montreal. Other stops were made at Chicago, New York, Ottawa and Niagara Falls.

Proves Modern Equipment Vital in Cutting Costs

Toronto, Ont.—Prime factor in reducing present production costs is material handling, regardless of number of parts involved, C. Heathcote, Chief Engineer, Massey-Harris Co., stressed during a lecture on this subject, April 7, before Toronto Chapter.

Mr. Heathcote, who has charge of development, planning, building and equipping all major projects and plant services for his company, described what has been accomplished by installing better production methods in Massey-Harris plants. Old factories were fully modernized, machine tools were discarded for newer models, modern lift trucks to speed handling replaced obsolete hand trucks—all at considerable cost.

The expenditure, he explained, was soon written off through increased production. Figures were quoted to prove that modern equipment is the only means of offsetting the increased wages and better working conditions now demanded by labor.

At the close of Mr. Heathcote's address, a sound film, "Romance of Two Hemispheres," was shown. The motion picture traced the history of the Massey-Harris Co. and showed their modern combines in operation throughout the world.

Chairman John Lengbridge presided and appealed for the support of all members in the current project to increase membership.

* * *

Eclipsing all previous attendance records, the 1948 Ladies Night was observed April 2 at the Royal York Hotel, with 480 members and guests present.

Mr. Lengbridge welcomed the gathering and proposed a toast to the ladies. Following dinner attendance prizes were awarded and a floor show was presented. Dancing concluded the evening's entertainment.

Douglas C. Cooper, Entertainment Chairman, was in charge of the event.

Nearly 600 Jam 'G. E. Night' at Electronics Park

Syracuse, N. Y.—An outstanding record for attendance and program interest was established by Syracuse Chapter at the "G. E. Night" presented April 13 at General Electric Co.'s recently opened Electronics Park.

More than 400 members and guests sat down to dinner in the cafeteria, and nearly 600 filled the Administration Building Auditorium to overflowing for the technical session.

In describing the "Park," J. A. Barratt, Manager of Manufacturing in the Transmitter Div., said it was the fulfillment of many years of planning to bring together all the company's electronic research and manufacturing. Started in 1945, the 155-acre installation comprises nine buildings with 30 acres of floor space, and 5500 employees.

Universal Tooling Employed

W. H. Woodlief, Assistant Superintendent of Transmitter Div., related interesting facts concerning manufacturing problems. Some operations are completed in one-twentieth of a second, whereas many others require the services of a skilled technician for more than a week.

Tooling is designed to be as universal as possible because of short runs and frequent model changes to keep abreast of latest developments. Products range from a tiny, two-way plane radio easily held on an outstretched hand, to complete AM, FM and Television broadcasting stations and the newest refinement—facsimile news, recorded in pictures and text on a wide, easily-read paper tape.

A. D. MacGovern, Assistant Superintendent on Government business, was next introduced. Unfortunately, the unsettled international situation limited his remarks to a brief reference regarding radar. Sets, tailored to the job, vary from a half-pound to 11 tons. Frequencies as high as 3000 megacycles are employed. Use of radar aboard ship is now an accomplished fact and standard sets are being built to aid navigation, he added.

Representing the Television Technical Sales Staff, H. W. Granberry conducted the group by way of a film through the G. E. Schenectady television studio and transmitter station, discussing problems in connection with this relatively new means of entertainment.

Techniques employed are similar to motion picture making. It is now possible to reduce studio light intensity, resulting in less heat, hence greater comfort to the actors. Installation of coaxial cables will soon link all of the principal broadcasting centers, said Mr. MacGovern.

A tour through the Transmitter Division Building followed, where many of the products described by the speakers were seen in assembly.

The meeting was arranged by Clifford Altobellis of the Planning and Wage Rate Section, a former Chapter Secretary. Mr. Altobellis and his reception committee greeted arrivals in the lobby of the Reception Building.

Pohle Speaks at U. of M.

Fort Devens, Mass.—Walter B. Pohle, Superintendent and Tool Engineer for the Spray Engineering Co. of Somerville, gave 200 students of the University of Massachusetts an insight into "Yankee Ingenuity and Design in Industry" during a lecture in the College Theatre, April 15. The program featuring ASTE'er Pohle was one of a series of career talks.

The well-known Boston inventor repeated the assembling and demonstration of one of his devices, first given at Massachusetts Institute of Technology and much in demand by educational groups.

Motion Study Benefits Public and Industry

St. Charles, Ill.—How to achieve "More Production Through Motion Study" was explained by Prof. H. T. Amrine of the Dept. of Industrial Engineering, Purdue University, speaking before Fox River Valley Chapter at a dinner meeting, April 6, in the Baker Hotel. The occasion was the annual "Open House."

A film, "Motion Study Is Everyone's Job," preceded Professor Amrine's talk. Advantages cited by the speaker included less effort, greater safety and increased earnings for the worker; larger profits to the manufacturer for expansion and creation of more jobs; and lower costs and higher quality goods for the public.

Appoints Representatives

Boston, Mass.—Recent appointments announced by Edward Blake Co. of Newton Centre include Walter D. Abbott of Hartford, Conn., and Lee Horneyer Co. of St. Louis, Mo.

Mr. Abbott is company representative in Eastern Massachusetts, Rhode Island, Maine, and part of New Hampshire, and the Horneyer firm covers Eastern Missouri and Southern Illinois. Lee H. Horneyer, who heads the concern, has Edward H. Ruder as an associate. All three are affiliated with ASTE.

Burke Joins Champion

Toledo, Ohio—Dale H. Burke, former tool engineer with Libbey Glass Co., has joined the engineering staff of the Champion Spark Plug Co. He will be associated with John Nolan and working on tool engineering and tool development under the supervision of Factory Manager B. H. Sibley.

During the war years Mr. Burke was employed by Willys-Overland Motors Aircraft Div.

Syracuse really packs them in at "G.E. Night" at Electronics Park, where attendance of nearly 600 members and guests overflowed the auditorium. In front row, from left, are: J. A. Barratt, Manager, Manufacturing Transmitter Division, General Electric Co.; E. J. Floring, Chapter Entertainment Chairman; C. J. Hoffman, Treasurer; R. D. Fulford, Secretary; L. H. Collins, Chairman; Fay Adkinson, First Vice-Chairman; H. D. Mozeen, Constitution and By-Laws Chairman; and R. D. Coseo, Past Chairman of the group.

350 Attend Symposium On Press and Die Design

Philadelphia, Pa.—April meeting of Philadelphia Chapter attacted some 350 members for a program on "Press and Die Design."

Speakers included William W. Schug, Vice-President, V & O Press Co., Arthur Schloz, Chief Engineer of Press Div., and Harry Sahlen, Master Mechanic, E. W. Bliss Co.

Die design for presses under 100 tons is a highly developed art, Mr. Schug declared, design details, listed as important to consider for mass production operation, being: (1) fill in bed for maximum support; (2) throat can be reduced, in the case of inclined presses; (3) make stroke of slide as short as possible; (4) provide lever knock-out for positive ejection; (5) design for inclining to various angles for ease of operation; and (6) where speed is to be considered, the friction clutch is preferable because of reduced shock.

Set-ups Shown in Slides

Using slide illustrations, Mr. Schug described numerous press and die designs and set-ups. One set-up showed the assembly of ball bearings in a dial press, with an output of approximately 55 assemblies per minute. If any parts are omitted because of empty hoppers or misalignment, the press automatically stops at that point.

Another interesting example concerned the forming of a return bend from straight copper tubing in six stations of a dial press at the rate of 50 pieces per minute. This operation includes expansion and insertion of rings in both ends of the bend.

A dial press mentioned completes the two assembly operations required in making roller chain linkages at a rate of 80 pitches per minute.

Forming .30 caliber machine gun cases in nine operations of the press presented one of the most complex set-ups shown. If misalignment occurs at any station, the press is automatically stopped. Just before ejection, varnish is applied to the mouth of the case.

Mr. Schloz, substituting for Joseph Klocke, showed slides of press and die set-ups for heavier presses. He described the purpose, procedure, and problems involved in the machine layouts pictured.

One set-up recalled by nearly everyone in the audience was the pressing of automobile hub caps. Exhibited at the New York World's Fair, the operation involved a 700-ton press with an output of 12 pieces per minute.

Smaller multiple slide machines, machines for assembling steel windows, collapsible tube presses, and inclined presses for heavy blanking work also were shown.

Mr. Sahlen supplemented Mr. Schloz' talk by presenting the merits of triple action presses, and discussing the economy of various presses for specific applications.

'Prof.' Donovan Conducts Silver Dollar 'Quiz'

Rockford, Ill.—"Why doesn't a steel ship sink?" and "For one silver dollar, will someone name a steel that cannot be annealed for remachining after hardening?" were typical of questions fired at Rockford members by "Prof. I. Q." Thomas J. Donovan, Jr., of Philadelphia, who conducted a "Quiz" program at the Chapter's April dinner meeting.

Silver dollars, and half dollars for partially correct answers, flashed as the technical Quiz proceeded. Much information was divulged and new approaches were presented on the perennial subject of heat treatment. Other questions concerned tools and steel in general.

Highly instructive and entertaining for the entire gathering, the program was financially rewarding for those able to answer the questions.

Prior to the Quiz, George C. Johnson, former Third Vice-President, reviewed the annual meeting and exposition at Cleveland and described committee activities at the Central Office.

Holden Heads Golden Gate

San Francisco, Calif.—New officers of Golden Gate Chapter were recently installed at the El Curtola Club in Oakland by Past Chairman Louis A. Talamini.

The 1948 Chapter executives are: Ernest C. Holden, Chairman; Florindo Viti, First Vice-Chairman; I. S. Minetti, Second Vice-Chairman; James V. Coulter, Secretary; and Basil H. Keys, Treasurer.

High Schools to Compete In Tool Design Contest

Elmira, N. Y.—A tool design contest among local high schools has been announced by Elmira Chapter. The competition is open to 1948 graduates outstanding in Mechanical Drawing. Purpose of the award is to promote interest in the field of Tool Engineering and Design.

Rules of the contest are:

1. Entrant must have completed Mechanical Drawing 1, 2 and 3 or equivalent as outlined in the Syllabus of the University of the State of New York or similar approved courses designated by the State of Pennsylvania.

2. Each recognized secondary school shall be allowed one entry.

3. Student entered shall be selected by the department head or class supervisor.

4. Each entrant shall submit his class record and a pencil sample of his work on a 17" x 22" or 18" x 24" standard sheet. Inked drawings will not be considered.

5. All entries must be mailed on or before June 14, 1948, to Bert J. Seifried, Secretary, Elmira Chapter, American Society of Tool Engineers, 358 N. Main St., Elmira, N. Y.

6. Drawings submitted shall become the property of Elmira Chapter, ASTE.

7. Decisions of the judges shall be final.

Award to be made at a regular Chapter meeting with all contestants and their instructors as guests, date to be announced.

Harry W. Rice, Education Chairman, is in charge of the second annual award contest to be sponsored by the Chapter. A set of drafting instruments and a set of jig and fixture design books will be presented as prizes.

Manager for Size Control

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"Do not let your cutting tools idle or rub on the surface of the metal," he warned, "give them some work to do. The properly selected tools will last longer, cut faster, give more accuracy, and breakage will be held at a minimum, by using speeds and feeds which will keep the tools deeply engaged with the metal, provided, of course, the tools are properly ground and rigidly supported."

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At the conclusion of the slide-illustrated talk, the members joined in an instructive question and answer period.

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350 Attend Symposium On Press and Die Design

Philadelphia, Pa.—April meeting of Philadelphia Chapter attacted some 350 members for a program on "Press and Die Design."

Speakers included William W. Schug, Vice-President, V & O Press Co., Arthur Schloz, Chief Engineer of Press Div., and Harry Sahlen, Master Mechanic, E. W. Bliss Co.

Die design for presses under 100 tons is a highly developed art, Mr. Schug declared, design details, listed as important to consider for mass production operation, being: (1) fill in bed for maximum support; (2) throat can be reduced, in the case of inclined presses; (3) make stroke of slide as short as possible; (4) provide lever knock-out for positive ejection; (5) design for inclining to various angles for ease of operation; and (6) where speed is to be considered, the friction clutch is preferable because of reduced shock.

Set-ups Shown in Slides

Using slide illustrations, Mr. Schug described numerous press and die designs and set-ups. One set-up showed the assembly of ball bearings in a dial press, with an output of approximately 55 assemblies per minute. If any parts are omitted because of empty hoppers or misalignment, the press automatically stops at that point.

Another interesting example concerned the forming of a return bend from straight copper tubing in six stations of a dial press at the rate of 50 pieces per minute. This operation includes expansion and insertion of rings in both ends of the bend.

A dial press mentioned completes the two assembly operations required in making roller chain linkages at a rate of 80 pitches per minute.

Forming .30 caliber machine gun cases in nine operations of the press presented one of the most complex set-ups shown. If misalignment occurs at any station, the press is automatically stopped. Just before ejection, varnish is applied to the mouth of the case.

Mr. Schloz, substituting for Joseph Klocke, showed slides of press and die set-ups for heavier presses. He described the purpose, procedure, and problems involved in the machine layouts pictured.

One set-up recalled by nearly everyone in the audience was the pressing of automobile hub caps. Exhibited at the New York World's Fair, the operation involved a 700-ton press with an output of 12 pieces per minute.

Smaller multiple slide machines, machines for assembling steel windows, collapsible tube presses, and inclined presses for heavy blanking work also were shown.

Mr. Sahlen supplemented Mr. Schloz' talk by presenting the merits of triple action presses, and discussing the economy of various presses for specific applications.

'Prof.' Donovan Conducts Silver Dollar 'Quiz'

Rockford, Ill.—"Why doesn't a steel ship sink?" and "For one silver dollar, will someone name a steel that cannot be annealed for remachining after hardening?" were typical of questions fired at Rockford members by "Prof. I. Q." Thomas J. Donovan, Jr., of Philadelphia, who conducted a "Quiz" program at the Chapter's April dinner meeting.

Silver dollars, and half dollars for partially correct answers, flashed as the technical Quiz proceeded. Much information was divulged and new approaches were presented on the perennial subject of heat treatment. Other questions concerned tools and steel in general.

Highly instructive and entertaining for the entire gathering, the program was financially rewarding for those able to answer the questions.

Prior to the Quiz, George C. Johnson, former Third Vice-President, reviewed the annual meeting and exposition at Cleveland and described committee activities at the Central Office.

Holden Heads Golden Gate

San Francisco, Calif.—New officers of Golden Gate Chapter were recently installed at the El Curtola Club in Oakland by Past Chairman Louis A. Talamini.

The 1948 Chapter executives are: Ernest C. Holden, Chairman; Florindo Viti, First Vice-Chairman; I. S. Minetti, Second Vice-Chairman; James V. Coulter, Secretary; and Basil H. Keys, Treasurer.

High Schools to Compete In Tool Design Contest

Elmira, N. Y.—A tool design contest among local high schools has been announced by Elmira Chapter. The competition is open to 1948 graduates outstanding in Mechanical Drawing. Purpose of the award is to promote interest in the field of Tool Engineering and Design.

Rules of the contest are:

1. Entrant must have completed Mechanical Drawing 1, 2 and 3 or equivalent as outlined in the Syllabus of the University of the State of New York or similar approved courses designated by the State of Pennsylvania.
2. Each recognized secondary school shall be allowed one entry.
3. Student entered shall be selected by the department head or class supervisor.
4. Each entrant shall submit his class record and a pencil sample of his work on a 17″ x 22″ or 18″ x 24″ standard sheet. Inked drawings will not be considered.
5. All entries must be mailed on or before June 14, 1948, to Bert J. Seifried, Secretary, Elmira Chapter, American Society of Tool Engineers, 358 N. Main St., Elmira, N. Y.
6. Drawings submitted shall become the property of Elmira Chapter, ASTE.
7. Decisions of the judges shall be final.

Award to be made at a regular Chapter meeting with all contestants and their instructors as guests, date to be announced.

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Will Head Denver Chapter for 1948-49 Term

Officers chosen by the Colorado ASTE group are from left: B. J. Hazewinkel, Chairman and Delegate, District Representative, L. S. Starrett Co.; C. J. Helton, First Vice-Chairman, Owner, Helton Motor Sales; E. H. Malley, Second Vice-Chairman, Special Machine Designer, Gates Rubber Co.; W. L. Foss, Secretary, Machine Tool Specialist, M. L. Foss, Inc., W. G. Axtell, Treasurer, Chief Eng.; and J. R. Matthew, Alternate, Engineer, both of Shwayder Bros., Inc.

Operator Safety Stressed In Die Design Lecture

St. Catharines, Ont.—Seventy-five Tool Engineers and friends of the St. Catharines and Welland areas were present to welcome J. I. Karash, Process Engineer of the Reliance Electric and Engineering Co., Cleveland, on the occasion of his second appearance before Niagara District Chapter.

Mr. Karash addressed the final meeting of the season, held May 6 at the Rose Villa in Welland. His program on "Dies for Inclinable Presses" was divided into four parts: (1) Principles of Safety in Press Operation; (2) Principles of Die Design for Inclinable Presses; (3) Variable Speed Drives for Punch Presses; and (4) Administration of a Safety Program.

In the first portion, slides showing safety devices for punch presses were used for criticism. The only safe way to operate a punch press, said the speaker, is to keep both hands out of the danger area.

Dual Controls Alternative

Where this is impossible, double hand controls are recommended—to be used with a friction type driving clutch which can be disengaged automatically during the down stroke, if the operator releases one of the dual controls. Such controls should be a second choice, he emphasized.

This first principle of safety was used in analyzing die designs, a wealth of technical data being presented in a series of slides.

The usual constant speed press cannot be adapted to variable speed drives as the available speed is always either too fast or too slow, with a resulting poor die life or loss of production. Counterweights or other devices were recommended to compensate for wear in press linkages, to prevent excessive punch pentration, and to promote increased die life.

In discussing variable speed drives, Mr. Karash presented analytical data to support his contention that there is no factual basis in the commonly accepted theory that the power on a flywheel punch press varies with the square of the speed.

In making sheet metal parts, the stock thickness is usually a very small part of the press stroke, and at the point of fracture there is almost infinite mechanical advantage in the press crank, so that the power loss theory does not apply.

The speaker demonstrated a very extensive knowledge of his subject and later conducted an informative question and answer period.

He was introduced by Past Chairman W. L. Sandham, who described his recent visit to the Reliance Electric Co. and commended the safe and effective use of punch presses and dies in the Cleveland plant.

Past Chairman Henry Hendriks expressed the Chapter's appreciation for a most interesting and educational program.

Chairman Harry Gorth presided and announced the annual Field Day to be held June 19 at Royal Niagara Golf Course.

Hasse, Circulation Mgr.

Detroit, Mich.—Charles J. Hasse, ASTE office manager, has been named Circulation Manager of *The Tool Engineer*, and subscribers' requests for change of address will clear through him.

All notices of new address should be sent directly to Mr. Hasse at the Society's headquarters, 1666 Penobscot Bldg., Detroit 26, Mich.

Utica Engineers Discuss Organization of Chapter

Utica, N. Y.—Probability of forming an ASTE Chapter was discussed during a meeting of about 100 local tool engineers, held April 13 in the Utica Tech Auditorium, New Hartford.

W. J. Gamble of Buffalo, a member of the National Public Relations Committee, defined the profession of tool engineering and described benefits to members and industry offered by the Society.

John D. Blair of Divine Bros. Co., explained the need of a Chapter. Prospects are good, he said, and would include Mohawk Valley eligibles. The group will meet again to discuss further organization plans. They hope to obtain a charter next fall.

A Program Committee, appointed during the meeting, is comprised of: William Hoffman, Savage Arms Corp.; John Delmont, Horrocks-Ibottson Co.; G. H. Gabrielson, Nichols Kinney and Ernest J. Masucci, Utica Tech; and Mr. Blair.

The new Chicago Pneumatic Tool plant coming to Utica is expected to help establish and expand the Chapter, Mr. Masucci said.

New Engineering Society

Columbus, Ohio—Formation of a new technical society has been announced by the recently-organized American Institute of Industrial Engineers.

Recognizing the increasing importance of industrial engineering, the Institute has been founded to raise professional standards; to protect society and industry through identification of qualified industrial engineers; to cooperate with and promote the aims of the National Society of Professional Engineers; and to aid colleges and universities devoted to teaching industrial engineering.

Eldon D. Raney of Ranco, Inc., is President, and Wyllys G. Stanton, Associate Professor of Industrial Engineering at Ohio State University, is Executive Secretary.

Elected to Handle Baltimore Chapter Activities

Baltimore Chapter affairs will be conducted this year by these officers. Seated, from left: A. J. Jones, 1st V.-Chm.; G. A. Exley, Chm.; and G. A. Evans, 2nd V.-Chm.; standing: A. J. Taormina, Treas.; and R. W. Althoff, Secy.

New Executive Group Takes Office at Houston Chapter

Installation of Houston officers took place at recent Chapter dinner meeting in the Sheffield Steel Corp. cafeteria. From left are: Dean F. Saurenman, Chm., Div. Eng., Baker Oil Tools, Inc.; Don E. MacKenzie, 1st V.-Chm.; Chief Tool Eng., Mission Mfg. Co.; Paul E. Brainard, 2nd V.-Chm., Supt., Emsco Derrick & Equipment Co.; Thomas J. Gilchrist, Secy., Process Eng., Hughes Tool Co.; and William L. Clarke, Treas., Mgr., P. D. Browne Company.

Gives Basic Rules for Multiple-Spindle Tooling

Poughkeepsie, N. Y.—R. R. Rhodehamel, General Sales Manager of The National Acme Co., Cleveland, Ohio, spoke on "Modern Means of Tooling Bar and Chucking Automatics," to approximately 75 members and guests attending a dinner meeting of Mid-Hudson Chapter, April 13.

Covering briefly the development of multiple spindle automatics since the first four-spindle machine was built in 1897, Mr. Rhodehamel described and illustrated, by means of slides, present design and construction of multiple spindle bar and chucking automatics.

7-Ton Carrier Inaudible

The spindle carrier, he stated, is the heart of the machine and is precision made. Weighing seven tons, the carrier on a 12″ chucking machine cannot be heard when indexing. Such precision and accuracy permits forming of parts to close tolerances. Positive cams have been found much more effective than quick changing cams, even though they require slightly more time to change.

A further development of the bar and chucking automatic is the second operation machine. This is basically a standard automatic with stock feed mechanism removed and a gravity or chain type work loader added, depending on shape of piece. By placing the standard and second operation machine side by side, one man can operate both machines, permitting completely finished parts at a high rate of production.

Mr. Rhodehamel emphasized that the basic, fundamental rules for tooling are simple. Keep work close, avoid overhanging, make side forming and end cuts in lower position, secondary cuts on side slides, light cuts on top slides, and cut-off ahead of feed operation. In order to maintain concentricity on drilled and reamed holes, he recommended drilling and reaming a depth not exceeding three or four times drill diameter.

Additional depths require a drill press. Drills should be approximately .005″ to .006″ smaller than the reamer, which should clean out and size the hole only. A concentricity of .001″ is possible on short holes, increasing to .002″ to .003″ on holes 5 or 6 diameters deep.

Declaring that many parts in common use today have been made available only by the high production possible on multiple spindle machines, the speaker related the sequence of operations and tooling required to produce a varied design of parts.

By means of modern attachments and tooling, unlimited types of operations can be performed providing production is of sufficient quantity to warrant the expenditure. On machines equipped with spindle-stopping mechanism, it is possible to mill and drill small holes other than the center hole.

A special worm-cutting attachment is available permitting the cutting of double, quadruple or five start threads. Such operations as cam milling, corrugation milling with a single, lead milling cutter, milling grooves by means of a rotating recessing attachment, and the forming of a square hole by means of rollers which crush the material onto a mandrel, are possible.

To overcome separate burring on the cut-off end, a rotating pick-up attachment permits burring to be done on the machine.

Many Factors Enter Decision

In deciding whether to produce a part on a single or multiple spindle machine, there are many factors to consider. Additional set-up time required on the multiple spindle automatic, tooling cost, annual production, and price of article should be carefully considered. Mr. Rhodehamel mentioned charts showing points at which it is most economical to make this change. Also available is a chart of recommended cutting coolant mixtures for various materials.

John Eighmie, Chairman of the Chamber of Commerce Bridge Approach Committee, gave a coffee talk on "The Problem of the Mid-Hudson Bridge Approaches."

During the business meeting preceding the technical session, a report on the national convention at Cleveland was presented by John L. Petz, Chapter Delegate.

Make it a family vacation party to the ASTE West Coast rally.

Shows How Electronics Outdates Push Buttons

Madison, Wis.—A pocket radio with tubes no larger than a peanut, a lipstick-sized broadcasting set having a range of seven miles, a fire detector that sets off an alarm when touched with a cigarette lighter flame, and a germ-killing light claimed to be the only known destroyer of common cold virus, were among spellbinding electronic devices demonstrated by Gordon Volkenant, Associate Director of Research, Minneapolis-Honeywell Regulator Co., April 6, before a Ladies Night audience at Madison Chapter.

In his address, "Gimmicks, Gadgets and Electronics," Mr. Volkenant explained in lay language that an electronic tube is only a valve regulating the flow of the electrons. Push buttons, he declared, are being replaced with many kinds of automatic controls.

Other developments, shown amid ringing bells, whining sirens, and flashing lights, included a dust collector, unconnected lights turned off by breathing on them and switched on by rubbing the glass bulbs, and an electronic oven which cooks steak in 15 seconds, using the basic principles employed in directing "drone" planes through space.

In the military field, he indicated, electronic refinements are also making rapid strides.

The program attracted a record attendance of approximately 150.

Discusses Problems In Drilling, Reaming

Louisville, Ky.—Sixty members and guests of Louisville Chapter met April 14 at the Kentucky Hotel to hear Earl W. Daugherty of the Chicago office of Whitman & Barnes Co. discuss "Drill and Reamer Applications."

Mr. Daugherty drew from his extensive experience in solving problems arising in drilling and reaming aluminum, plastics, cast iron, steel and kindred alloys. Fundamentals that operators should follow in using cutting tools, such as chip clearances, sharpening, feeds and speeds, were reviewed. The speaker also described methods used in manufacturing drills and reamers.

Chair John Black presided and First Vice-Chairman N. H. Booker introduced the guest speaker.

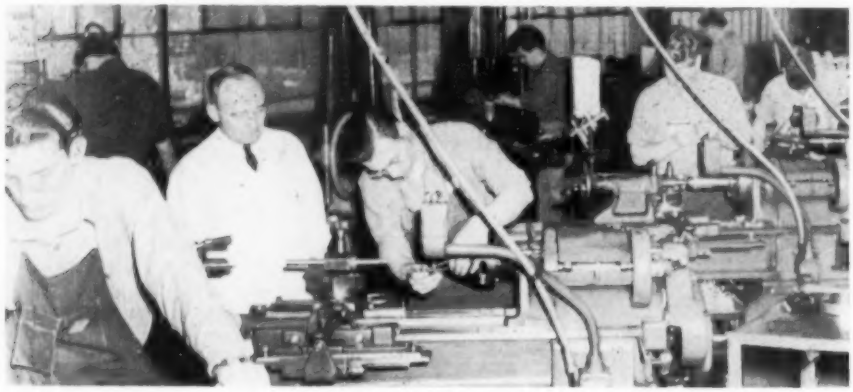
Hutchings Succeeds Coe

Manchester, Conn.—Albert R. Hutchings has been appointed Executive Engineer in charge of engineering and manufacturing for The Carlyle Johnson Machine Company, succeeding A. R. Coe, Vice-President, who has retired.

A graduate of Northeastern University, Mr. Hutchings was formerly associated with Kenneth A. McIntyre Associates, Cleveland, Ohio; B. F. Perkins & Son, Inc., Holyoke; and Compo Shoe Machinery Corp., Boston, Mass.

His technical affiliations include ASME and ASTE. Mr. Coe also is a member of Hartford Chapter, ASTE.

Williamsport Institute Has ASTE-Approved Courses



ASTE'er Don D. Hennigan, instructor in Tool Design and Tool Making at Williamsport Technical Institute, watches student check boring of part being turned on lathe. Mr. Hennigan, with Harold Shafer, Jesse Strasburg and Charles Winter, Chapter Chairmen from 1944-47, was instrumental in having Institute certified as an ASTE-approved School. Although one of the smaller Chapters, the Williamsport ASTE group is especially active in educational projects.

Makes Synthetic Rubber On Lecture Platform

Milwaukee, Wis.—A demonstration of synthetic rubber making highlighted a lecture on "How Industry Uses Rubber," given April 8 by D. W. Reagan, Representative of the B. F. Goodrich Co., Akron, Ohio, before an audience of about 125 members and guests of Milwaukee Chapter.

A few minutes after pouring an acetic acid and synthetic latex in a mortar, Mr. Reagan produced a ball of synthetic rubber which was passed around for examination.

A Technicolor sound film showing rubber manufacture and industrial uses aroused intense interest. Following the film the speaker reported on wartime rubber production. Numerous questions were asked from the floor and capably answered by Mr. Reagan.

Another film, "Building the Alcan Highway," also was shown.

Chairman Joseph Ebner welcomed the group and Program Chairman Arthur Gudert introduced the speaker.

Coming Meetings

BOSTON—June 12, Annual Outing, Marlboro Country Club, Marlboro, Mass. Golf, athletic events, refreshments, prizes, banquet and entertainment.

COLUMBUS—June 12, Annual Picnic, 2:00 P. M., Oak Park.

DAYTON—June 14, 6:30 P. M., Miami Hotel. Speaker: John F. Ireland, Elgin National Watch Co. Subject: "Jewel Bearing Manufactory." July 12, 6:00 P. M., Inland Gun Club, Fun Night.

ELMIRA—August, Annual Outing.

HAMILTON—Annual Field Day, June 25, Cuttins Field, Guelph, Ont.

LOS ANGELES—October 11, 12, 13. ASTE 16th Semi-Annual Meeting.

NIAGARA DISTRICT—Annual Field Day, June 19, Royal Niagara Golf Course.

PITTSBURGH—June 11, Annual Picnic, Paradise Gardens (formerly Daniels Farms), North Side Pittsburgh. Sports, refreshments, dinner. Guests welcome.

In Charge of Press Sales

Chicago, Ill.—William C. Massow of Chicago Chapter, ASTE, has been appointed Assistant Sales Manager in charge of press sales by Walsh Press & Die Co., Div. American Gage & Machine Co., Chicago, Ill.

A graduate of Northwestern University, Mr. Massow is well known among press users through his previous connection with Minster Machine Co.

Magnesium Armor Stumps Modern Movie 'Knight'

Wayne Ewing and Paul R. Burt of Arrowsmith Tool & Die Co., and Leif Ericson, film player, look on as Ward Bond, who appears with Mr. Ericson in "Joan of Lorraine," struggles with trappings for his magnesium armor. At recent Los Angeles Chapter meeting, Mr. Burt discussed problems encountered in fabricating 100 suits of such armor, required for Hollywood film production.

Resistance Welding Award

Philadelphia, Pa.—Prizes ranging from $750 to $200 will be awarded by the Resistance Welder Manufacturers' Association for the best papers dealing with resistance welding subjects submitted to the American Welding Society before July 31, 1948.

First prize will be awarded to the best manuscript by individuals in industry, private or government laboratories, or in consulting engineering work.

Full details are available from Resistance Welder Manufacturers' Association, 505 Arch Street, Philadelphia, Pa., or from the American Welding Society, 33 West 39th Street, New York City.

Radio Frequency Heating Economical on Long Runs

Fond du Lac, Wis.—John Stead, Sales Engineer for the Radio-Frequency Heating Division of Westinghouse Corp., Chicago, Ill., addressed a meeting of Fond du Lac Chapter at the Heidelberg Club, Sheboygan, April 9. His subject was "Induction and Dielectric Heating."

With the aid of slides and a sound projector, Mr. Stead described wartime developments in the field of radio frequency heating. Applications of both induction and dielectric heating were thoroughly differentiated and discussed.

For long production runs, he indicated, these types of heating are the newest and most economical. The latest methods also permit hitherto impossible work in this field. Small items hardened by radio frequency were exhibited.

Jule P. Schommer, Chapter Chairman, presided at the meeting attended by approximately 90 members.

Among guests was Edwardo Maynetto from Lima, Peru, who is taking a short training program at Giddings & Lewis Machine Tool Co.

Obituary

David O. Goudie

David O. Goudie, 59, District Sales Manager for Winter Bros. Co., died March 11 of a heart attack suffered as he entered the Rackham Educational Memorial in Detroit.

When he collapsed Mr. Goudie was accompanied by two friends with whom he planned to lunch at the Engineering Society of Detroit.

In addition to his membership in ESD and Detroit Chapter, ASTE, he was affiliated with Detroit Golf and Detroit Athletic clubs; Oriental Lodge, F. & A. M., King Cyrus Chapter; and Detroit Commandery No. 1, Knights Templar.

Summer Course at Cornell

Ithaca, N. Y.—A summer refresher course in sales engineering, designed expressly for the machine tool industry, is announced by Cornell University, in cooperation with the National Machine Tool Builders' Association and the American Tool Distributors' Association.

The course, to be held July 12 through 23, will be limited to 50 men selected from the sales organizations of member companies in the two associations.

Applications are to be made through NMTBA and AMTA.

Lectures on Die Casting

Baltimore, Md.—C. R. Maxon of the Market Development Div., New Jersey Zinc Co., presented a film lecture on the operation of die casting equipment, as the technical feature of a Baltimore Chapter meeting, April 7.

In the subsequent open forum, Mr. Maxon was bombarded with questions.

Thomas F. Burke, Chapter Delegate, reported on the recent House of Delegates meeting at Cleveland.

Directory of A.S.T.E. Chapter Chairmen

AKRON, NO. 47
Second Monday *
George A. Irwin, *Chairman*
143 Malacca Ave.
Akron, Ohio

ATLANTA, NO. 61
Third Monday *
George W. Brown, *Chairman*
Big A. Road,
Toccoa, Ga.

BALTIMORE, NO. 13
First Wednesday *
George A. Exley, *Chairman*
Bendix Radio Div.
E. Joppa Road, Towson
Baltimore 4, Md.

BINGHAMTON, NO. 35
Second Wednesday *
Roger E. Coles, *Chairman*
506 Mountain View Dr.,
Union, N. Y.

BOSTON, NO. 33
Second Thursday *
William W. Young, *Chairman*
Pratt & Whitney Div.
238 Main St.,
Cambridge, Mass.

BUFFALO-NIAGARA FRONTIER, NO. 10
Second Wednesday *
Garrett Kingston, *Chairman*
38 Schauf St.,
Buffalo 11, N. Y.

CEDAR RAPIDS, NO. 71
Third Wednesday *
Raymond E. Bextine, *Chairman*
Link-Belt Speeder Corp.
1201 Sixth St., S. W.,
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA NO. 22
Second Tuesday *
Albert Anderson, *Chairman*
446 N. Duke St.,
Lancaster, Pa.

CHICAGO, NO. 5
First Monday *
Harold M. Taylor, *Chairman*
Supplies, Inc.
564 W. Adams St.,
Chicago 6, Ill.

CINCINNATI, NO. 21
Second Tuesday *
George H. Simon, *Chairman*
7 W. Pike St.,
Covington, Ky.

CLEVELAND, NO. 3
Second Friday *
Jack H. Schron, *Chairman*
Glenn Tool & Mfg. Co.
716 E. 163rd St.,
Cleveland 10, Ohio

COLUMBUS, NO. 36
Second Wednesday *
Albert W. Montague, *Chairman*
829 Vernon Rd.,
Columbus 9, Ohio

DAYTON, NO. 18
Second Monday *
E. J. Seifreat, *Chairman*
1006 Harries Bldg.,
Dayton, Ohio

DECATUR, NO. 58
Second Monday *
Fred W. Sobottka, *Chairman*
1620 E. Cleveland Ave.,
Decatur, Ill.

DENVER, NO. 77
First Wednesday *
Ben J. Hazewinkel, *Chairman*
2355 Jasmine St.,
Denver 7, Colo.

DETROIT, NO. 1
Second Thursday *
Andrew Carnegie, *Chairman*
2970 W. Grand Blvd.,
Detroit 2, Mich.

ELMIRA, NO. 24
First Monday *
James F. Deegan, *Chairman*
Lower Maple Ave.,
Elmira, N. Y.

ERIE, NO. 62
First Tuesday *
Vincent Peck, *Chairman*
1110 W. 30th St.,
Erie, Pa.

EVANSVILLE, NO. 73
Second Monday *
Clyde E. Yost, *Chairman*
700 Villa Dr.,
Evansville, Ind.

FAIRFIELD CTY., NO. 6
First Wednesday *
William C. McDonough, *Chairman*
R.F.D. 2, Danbury Rd.,
Wilton, Conn.

FLINT, NO. 68
Third Thursday
Harlan T. Pierpont, Jr., *Chairman*
1677 Woodburn Dr.,
Flint 3, Mich.

FOND DU LAC, NO. 45
Second Friday *
Jule P. Schommer, *Chairman*
59 Polk St., Oshkosh, Wis.

FORT WAYNE, NO. 56
Second Wednesday *
Leonard Roebel, *Chairman*
206 E. Sherwood Terrace,
Ft. Wayne, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Roger F. Waindle, *Chairman*
123 So. Jackson Ave.,
Batavia, Ill.

GOLDEN GATE, NO. 28
Third Tuesday *
Ernest C. Holden, *Chairman*
3122 Guido St.,
Oakland 2, Calif.

HAMILTON, NO. 42
Second Friday *
Gordon Hall, *Chairman*
29 Nelson Ave.,
Burlington, Ont.

HARTFORD, NO. 7
First Monday *
William F. Jarvis, *Chairman*
Chas. L. Jarvis Co.
Pease Ave.,
Middletown, Conn.

HOUSTON, NO. 29
Second Tuesday *
Dean Saurenman, *Chairman*
Baker Oil Tools, Inc.
Box 3048, Houston 1, Texas

INDIANAPOLIS, NO. 37
First Thursday *
Clarence M. Wetzel, *Chairman*
4910 E. 12th St.,
Indianapolis, Ind.

KANSAS CITY, NO. 57
First Wednesday *
F. Ward Osborn, *Chairman*
819 West College,
Independence, Mo.

LITTLE RHODY, NO. 53
Third Wednesday *
Robert B. Parker, *Chairman*
76 Ferncrest Ave.,
Edgewood, R. I.

LOS ANGELES, NO. 27
Second Thursday *
Leslie F. Hawes, *Chairman*
2616 W. 78th Pl.,
Inglewood, Calif.

LOUISVILLE, NO. 54
Second Wednesday
John A. Black, *Chairman*
3733 N. Western Pkwy.,
Louisville 12, Ky.

MADISON, NO. 75
1st Tues. After 1st Mon. *
Lorenz A. Leifer, *Chairman*
13 Oxford Pl.,
Madison 4, Wis.

MID-HUDSON, NO. 74
Second Tuesday *
Llewellyn H. Tenney, *Chairman*
76 Grand Ave.,
Poughkeepsie, N. Y.

MILWAUKEE, NO. 4
Second Thursday *
Joseph Ebner, *Chairman*
4215 N. 26th St.,
Milwaukee, Wis.

MONTREAL, NO. 50
Second Thursday *
G. S. Clarke, *Chairman*
1135 Joliette
Coteau Rouge Rd.,
Longueuil, Que.

MUNCIE, NO. 70
Second Wednesday *
William J. Brown, *Chairman*
1212 Bundy Court,
New Castle, Ind.

NASHVILLE, NO. 43
Third Friday *
C. L. McCaffrey, *Chairman*
1513 Ashwood Ave.,
Nashville, Tenn.

NEW HAVEN, NO. 41
Second Thursday *
Alton V. Pollard, *Chairman*
American Brass Co.
55 Liberty St.,
Ansonia, Conn.

NEW ORLEANS, NO. 60
Second Wednesday *
Carl Hazlewood, *Chairman*
6574 General Haig,
New Orleans 19, La.

NEW YORK, GREATER, NO. 34
First Monday *
W. H. Lentz, *Chairman*
630 Victory Blvd., Grymes Hill,
Staten Island, N. Y.

NIAGARA DISTRICT, NO. 65
First Thursday *
H. F. Gorth, *Chairman*
62 Thomas St.,
St. Catharines, Ont.

NORTH TEXAS, NO. 51
Second Friday *
John A. Lapham, *Chairman*
2700 Western Ave.,
Fort Worth 7, Texas

NORTHERN NEW JERSEY, NO. 14
Second Tuesday *
Charles B. Carlson, *Chairman*
Ediphone Division
Thomas Edison, Inc.
West Orange, N. J.

PEORIA, NO. 31
First Tuesday *
Gordon Swardenski, *Chairman*
214 Weiman Ave.,
Bartonville 7, Ill.

PHILADELPHIA, NO. 15
Third Thursday *
Samuel R. Boyer, *Chairman*
5865 Hadfield St.,
Philadelphia 43, Pa.

PITTSBURGH, NO. 8
First Friday *
Walter S. Risser, *Chairman*
1332 Franklin Ave.,
Pittsburgh 21, Pa.

PONTIAC, NO. 69
Third Thursday *
Eldon Hall, *Chairman*
5048 Mound Rd.,
Warren, Mich.

PORTLAND (MAINE), NO. 46
Fourth Friday *
Harold D. Andrews, *Chairman*
Twin City Machine Co.
31 Mechanics Row
Auburn, Maine

PORTLAND (OREGON), NO. 63
Last Tuesday *
Everett Werner, *Chairman*
2919 S.E. Clay Ave.,
Portland 15, Ore.

POTOMAC, NO. 48
First Thursday *
Daniel T. Hilleary, *Chairman*
116 N. Highland St.,
Arlington, Va.

RACINE, NO. 2
First Monday *
William Reinhardt, Jr., *Chairman*
837 Blaine Blvd.,
Racine, Wis.

RICHMOND, NO. 66
Second Tuesday *
Ralph McKee, *Chairman*
Webster, Ind.

ROCHESTER, NO. 16
First Monday *
H. O. Simon, *Chairman*
94 Harvington Dr.,
Rochester 12, N. Y.

ROCKFORD, NO. 12
First Thursday *
H. A. Nelson, *Chairman*
Barber Colman Co.
150 Loomis St.,
Rockford, Ill.

ST. LOUIS, NO. 17
First Thursday *
Harrel M. Creasey, *Chairman*
Box 708-6, Route 6,
Sappington 23, Mo.

SAN DIEGO, NO. 44
Second Tuesday *
Raymond W. Peters, *Chairman*
6952 Fitch Court,
San Diego 11, Calif.

SCHENECTADY, NO. 20
Second Thursday *
Ray E. Ellis, *Chairman*
1448 Myron St.,
Schenectady 8, N. Y.

SEATTLE, NO. 39
Second Tuesday *
Clyde A. Peterson, *Chairman*
Rt. 2, Box 210
Bellevue, Wash.

SOUTH BEND, NO. 30
Second Tuesday *
Norman R. Smith, *Chairman*
3941 Cottage Ave.,
Mishawaka, Ind.

SPRINGFIELD (ILLINOIS), NO. 64
First Tuesday *
H. C. Chambers, *Chairman*
1817 Dial Court,
Springfield, Ill.

SPRINGFIELD (MASS.), NO. 32
Second Monday *
George R. Brown, *Chairman*
52 Barber St.,
Springfield, Mass.

SPRINGFIELD (OHIO), NO. 76
Fourth Thursday *
Joseph E. Charters, *Chairman*
The Oliver Corp.
270 Monroe St.,
Springfield 99, Ohio

SYRACUSE, NO. 19
Second Tuesday *
Lester H. Collins, *Chairman*
177 Ridgeway Ave.,
Syracuse, N. Y.

TOLEDO, NO. 9
Second Wednesday *
Lawrence F. Rothert, *Chairman*
6021 Acres Rd.,
Sylvania, Ohio

TORONTO, NO. 26
First Wednesday *
John W. Lengbridge, *Chairman*
257 Wychwood Ave.,
Toronto, Ont.

TRI CITIES, NO. 23
First Wednesday *
E. B. Benson, *Chairman*
2440 27th St.,
Moline, Ill.

TWIN CITIES, NO. 11
First Wednesday *
Harold D. Sullivan, *Chairman*
4038 28th Ave. S.
Minneapolis 6, Minn.

TWIN STATES, NO. 40
Second Wednesday *
W. C. Hadfield, *Chairman*
33 Pine St., Springfield, Vt.

WESTERN MICHIGAN, NO. 38
Second Monday *
Edmund E. Cedarquist, *Chairman*
523 Fremont Ave. N.W.,
Grand Rapids 4, Mich.

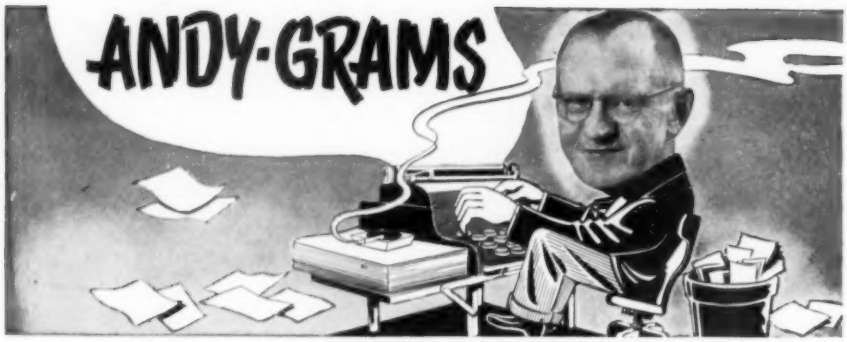
WICHITA, NO. 52
Second Wednesday *
Leigh S. Icke, *Chairman*
657 N. Terrace Dr.,
Wichita 6, Kansas

WILLIAMSPORT, NO. 49
Second Monday *
Delbert M. Lowrey, *Chairman*
1233 Park Ave.,
Williamsport, Pa.

WINDSOR, NO. 55
Second Monday *
Alfred J. Hodgins, *Chairman*
995 Lawrence Rd.,
Windsor, Ont.

WORCESTER, NO. 25
First Tuesday *
Ralph E. Rawling, *Chairman*
22 Elm St., Shrewsbury, Mass.

*CHAPTER MEETING NIGHT



Driving into South Bend last week—well, May 11, to be exact—I stopped in on the local ASTE Chapter to find myself right in the middle of a Past Chairmen's Night. The meeting was at the Isaak Walton Club, to which I'd like to belong if I lived in the town although I'm too tender hearted to hook a fish besides which I never catch any anyway. Still, there was a time—but why brag? There's probably bigger fish in the seas.

Riding with me to break the monotony was Henning Freden, late of the Detroit College of Applied Science but now on the way to becoming a captain of industry. At the meeting, he and Horace Wentzell (past Nat'l Director and Grand Old Man of South Bend Chapter) got to talking, and it turned out that they had mutual friends in Andy Anholtt and Jimmy Giern of Giern & Anholtt, both old timers in the ASTE and patrons of the fine arts besides. Lots o' reminiscences!

One by one, the Past Ch'men were introduced—Art (Buzz) Regan, Horace Wentzell, Stanley Cope, Frank Foote, Carl Stevason, Paul Winkelmann, and Ed Helm. Seems that Ernie Barber was absent; either that or I missed out or can't read my notes as usual. Incidentally, that's one thing I like about Frank Curtis' longhand—the guy just doesn't need a typewriter to be legible.

But coming back to South Bend, one thing about their Chapter leaders is that they're all finished speakers—in fact, incumbent Ch'man Norman Smith is ace in the Toastmasters Club—so, when they asked me to say a few words I developed a sudden inferiority complex but managed to muddle through somehow. However, they had a ventriloquist that made up for my deficiencies.

Next day, Ed Helm took me to the Studebaker plant, where I met Clark Zesinger, in charge of tooling, and Stanley Bojarski, inspector, and had a good long walk besides. The local boys call the Studebaker plant a small shop but it's plenty big and makes up in good tooling for what it may lack in area as compared to some of the Detroit automotive plants. They're real good cars, the Studebakers, and so meticulously processed and assembled that, by the time I got through my tour, I was ready to give a broad hint that I'd like to buy one only several of the boys told me they were on a long waiting list and I didn't want 'em to lose their turn. Still, if there's a loose one around. . . .

Next, Ed took me up to the Winkelmann Company where, with Paul Winkelmann and Norman Smith, he is one of a group established in industrial engineering and manufacture. Among two interesting gadgets developed by the concern is a "travel jack" weighing only 15 lbs. that lifts a ton weight as easy as a box o' soapflakes and makes it as easily mobile, and a practice golf ball with base—called StroKing—that lets you whang away all day without having to chase the ball. Should be demonstrated at all of the coming ASTE golf tournaments.

Next, to call on Stanley Cope who is rated tops in die design and runs several schools specializing in tool and die design (courses separate) which should be better publicized if only to save me a lot of time answering enquiries from budding tool engineers who want to get into the designing game. Appropos this I heard an interesting story.

Seems that a Swiss concern making pressed metal kitchenware had had all their dies made in Germany, then, during the occupation after the war, the Russians had confiscated all equipment for making these dies and the tool drawings as well. So, the prex sent his son all over Europe trying to find a school teaching die design. No soap! So, he was sent to the U.S.A. where, arrived in New York, he was directed to the ASTE Tool Show in Cleveland. There, after considerable enquiry, he was directed to the Cope school in South Bend and, after an interval, went back to Switzerland with the necessary "knowhow." Quite a roundabout way to a goal.

While in South Bend, I also met Oscar Johnson from Iowa, and Joe Kim, come all the way from Hawaii—where he was born—to set himself up as an industrial engineer. Seems to make no difference where a guy is born; if he has the stuff, and the ambition to forge ahead, he's just going to carve a place for himself regardless. Especially in this ASTE.

From one thing to another, I was quite surprised to hear that the University of Michigan is considering curtailing its tool engineering course. To my way of thinking—and my views will be shared by many—this is a backward step in direct contrast to trends in progressive technical institutes where tool engineering is now considered among essentials in curriculae and given as separate degree courses. And U of M's Department of Metal Processing, under direction of Prof. O. W. Boston, has made dire and marked contributions to our industrial economy.

In this connection, I read an article in the current issue of Liberty in which the author brought out that it was machines as much as men that decided the issue in the late war. Of course, we've known that right along; the point is, however, that the machinery of war could not be produced without tools, nor could tools be designed and built without specialized knowhow.

Now, those of us who were in the thick of wartime production have poignant memory of the acute shortage of trained tool engineers. Consequently, graybeards who had retired and wanted nothing so much as quiet fishing were drafted to fill the gaps, and these men and others largely in the middle age group carried loads under which even the huskiest youngsters would have staggered. It wasn't funny! And even now we are deplorably short of men trained "to make things", would be in a precarious state should the present "cold war" become suddenly hot.

Well, none so blind as they who will not see. Our colleges are turning out theorists and research workers who are doing wonderful things in developing atomic power, constructive as well as destructive, and other wonders of this age, but these things are white elephants to all practical purposes—liabilities rather than assets—unless they can be mass produced in emergency. And that's why we need more tool engineers, not fewer.

Fortunately, our larger industries—and some of our smaller as well—are alive to the need for trained men, and many industrial concerns now either maintain their own technical schools or set up practical apprenticeship courses in collaboration with technical studies in nearby schools. Others subsidize scholarships, as in the case of the Monarch Machine Tool Company which, recently, established a fund of $30,000 from which three scholarships will be awarded, yearly, over a period of five years, to outstanding high school graduates who wish to pursue studies in engineering. Each award—$2000—will go a long way toward defraying college expenses.

Seems that no matter how smart some men get, they've still plenty to learn. For example, we're spending countless billions either making war or preparing for war, and spending other billions and countless man hours trying to muddle our way toward a permanent peace, and all the while our braintrusters overlook the fact that the surest way to avoid wars and to achieve peace is through education. And there's where we spend the least of our public money! I'll leave you to think that over.

ASTEely Yours

Andy

THE TOOL ENGINEER'S *Service Bureau*

FREE BOOKLETS AND CATALOGS CURRENTLY OFFERED BY MANUFACTURERS

Abrasive Diamond Compound

Circular describes cost-saving fine grinding, lapping, and polishing uses of Hyprez (pure) diamond compounds available in hermetically sealed cartridge for quick loading in gun-applicator. *Sapphire Products Div'n, Elgin National Watch Co.*, Aurora, Ill., or *Engis Equipment Co.*, 431 So. Dearborn St., Chicago 5.

Belting Techniques

Necessity for full utilization of older machine tools, employing belt drives, gave rise to the Unisplice method of handling solid cotton woven belting. Many resultant applications, offering good performance and economy, are listed in bulletin. *Unisplice Belting Co.*, 1119 Wolfendale St., Pittsburgh 12, Pa.

Broaches, Naloy

Bulletin shows various types of Red Ring broaches and their applications, describing how the Naloy Process after finish grinding of the broach increases surface hardness, eliminates any soft skin left from grinding, and improves other qualities. *National Broach and Machine Co.*, 5600 St. Jean, Detroit 13.

Carbide Comparison Chart

Notebook "comparison chart of cemented carbide grades" shows the range of grades produced by leading manufacturers, the design application of each, materials to be used on, and Rockwell hardness. *Adamas Carbide Corp'n*, 1819 Broadway, New York 23.

Cylinders, Actuating

Bulletin suggests 20 uses of heavy duty Ledeen actuating cylinders for oil, water, or air operation. *Engineering Products Co.*, 1600 So. San Pedro, Los Angeles 15.

Densified Wood

Densified wood made from phenolic resins is a basic material for industry with unusual properties for a wide variety of applications, described in 16-page brochure. *Bakelite Corp'n*, 30 E. 42nd St., New York 17.

Diamond Tools

Sixty-two page catalog and guide to use of industrial diamond tools for grinding wheel truing and dressing, roughing and semi-finishing, form dressing, boring and turning, drilling, lapping, and so on. Also described are gages and diamond powder. *J. K. Smit & Sons*, 157 Chambers St., New York 7.

Drilling Fixture

Folder on easily installed air-operated universal drilling fixture which permits accurate and speedy drilling of small parts up to 1" dia. *The Porter Machine Co.*, 3139 Enyart Ave., Cincinnati 9, O.

Dust Collectors

Bulletin shows typical installations of unit type Dustkop collectors for stopping dusts and lint from grinding, polishing and buffing operations; also, collectors to trap the mist and vapor from thread grinders and centerless grinders. *Aget-Detroit Co.*, Ann Arbor, Mich.

Jig Bushings, Talide

Bulletin lists about 800 sizes of standard Talide (tungsten carbide) drill jig bushings. *Metal Carbides Corp'n*, Youngstown 5, O.

Lifting Tables

Folder illustrates 1-Ton Di-Lift Tables for moving, lifting, and lowering dies, for supporting overhanging work, or to use as portable work bench. *Montgomery & Co.*, 53 Park Pl., New York 7.

Motors, Fractional H.P.

Bulletin describes Torq fractional horsepower electric motors with thermostatic overload protection, triple-protected windings, and centrifugal starting switch. *Torq Electric Corp'n*, 1086 Interstate St., Bedford, O.

Mounted Wheels

Folder describes self-centering, mounted grinding wheel and spindle adapter to suit Dumore, Heald and other standard grinders. Color-coded, wheels are available in all standard bonds, grits, sizes and shapes; also, diamond wheels and carbide burs. *J & S Tool Co., Inc.*, 477 Main St., East Orange, N. J.

Numbering Machines

Bulletin illustrates various types of numbering heads and machines—selective, quick set, automatic indenting, embossing, and hot stamping. Also shown are hand stamps, and numbering and lettering presses. *Numberall Stamp and Tool Co.*, Huguenot Park, Staten Island 12, N. Y.

Oiler Wall Chart

Large wall chart illustrates many types of Gits oilers, oil and grease seals, and other lubricating devices. Highly visible, each product shown is accompanied by designation and catalog page reference. *Gits Brothers Mfg. Co.*, 1830 So. Kilbourn Ave., Chicago 23.

Press, Air-Hydraulic

Leaflet describes 2½ and 5-ton presses, 2" or 5" stroke, featuring air-hydraulic power application which employs but one moving part floating smoothly on a cushion of oil. Fast and powerful. *Hy-Air Products Co.*, 1707 W. Michigan, Jackson, Mich.

Press Room Equipment

Sixteen-page catalog shows automatic equipment for economical press room operation—stock straighteners, slide and roll feeds for coil and strip stock, oilers, stock reels, centralizing reels, and h-d coil cradles; also, multi-slide machine for high speed fabrication of precision parts from coil stock. *U.S. Tool Co., Inc.*, Ampere (East Orange), N. J.

Recessing Tools

Bulletin illustrates tools for accurate recessing, backfacing, and grooving operations. Tools are adaptable to any drill press, boring mill, turret lathe, automatic, milling machine, and other machines. *The Maxwell Company*, Bedford, Ohio.

Screw Machine Master-Pushers

Bulletins cover Galco and H & G master pushers for automatic and hand screw machines. Pushers employ collet-type action which assures positive feed, prevents scoring of the bar stock, and reduces wear. One-piece insert is quickly changed at the machine. *Modern Collet and Machine Co.*, 401 Salliotte St., Ecorse 18, Mich.

Screws, Taped

Leaflet announces availability of Holtite machine, tapping, and wood screws on tape for quick indentification and easy handling. Tape may be printed for manufacturers supplying screws with their product. Screws are machine counted, color-coded, and supplied in individual tapes for any number of screws up to 12, or in continuous tapes on spools. *Continental Screw Co.*, New Bedford, Mass.

Spindles, Precision

Bulletin describes wide range of spindles and their applications for grinding, milling, boring, and other operations. Belt-driven and motorized spindles feature cool operation at high speeds and sealed-in lubrication. *Pope Machinery Corp'n*, 261 River St., Haverhill, Mass.

Spray Painting Equipment

Complete new catalog shows all recent additions to complete line of spray painting equipment and accessories. Each product is followed by illustrated descriptions of set-ups available. Included are light and heavy duty automatic spray guns for all types of standard finishing, and guns for fine detail and special purpose work. *Binks Manufacturing Co.*, 3116-40 Carroll Ave., Chicago 12.

Steels, Nickel Alloy

Revised treatise of 24 pages on the mechanical properties of heat treated wrought nickel alloy steels, with detailed information on heat treating methods and suggested applications. *The Int'l Nickel Co., Inc.*, 67 Wall St., New York 5.

Tachoscope

Bulletin covers two new speed measuring instruments—the O-Z Improved Direct Reading Tachoscope, chronometric, which shows per minute speeds, R.P.M. and F.P.M.; and the O-Z Improved Tachoscope, a precision revolution counter synchronized with a high grade Swiss stop watch, serving as speed indicator, stop watch, calibration check for tachometers. *O. Zernickow Co.*, 15 Park Row, New York 7.

Taps, High Speed

Handbook of 64 pages catalogs and describes the unusually complete line of high speed commercial and precision ground taps, both standard and special. *Sheffield Corp'n*, Dayton 1, O.

Tube and Pipe Mills

Bulletin describes mills for transforming strip steel into mechanical tubing up to 4" O.D. and American Standard Weight pipe ½" through 2". Available in 3 sizes—light wall, medium wall, and heavy wall. *American Electric Fusion Corp'n*, 2600 Diversey Ave., Chicago 47.

Welding Electrodes, Bronze

Bulletin of 24 pages on welding techniques and procedures, using Ampco bronze electrodes, includes a comprehensive weldability chart showing diversified applications and recommendations for each electrode. Data is given on aluminum bronze, phosphor bronze, beryllium copper, and silicon bronze electrodes. *Ampco Metal, Inc.*, Milwaukee 4, Wisc.

GOOD READING

A Guide to Significant Books and Pamphlets of Interest to Tool Engineers

MICROMERITICS, by **J. M. Dalla-Valle**, has been thoroughly revised to include results of recent progress made in the general study of the behavior and characteristics of small particles, and to incorporate five additional chapters on studies made in new fields.

Of interest to powder metallurgists, one chapter is given to the behavior of particles under pressure and is said to present the only published theory on this subject (confined to cohesionless material). Much new information is made available on the behavior of particles in an electric field, which finds application in the cleaning of particulate material by utilizing dielectric differences of the various components, and in dust removal from the air.

This highly technical work covers studies in many diversified fields. However, they are important one to another, i. e. there is a natural transition from a study of dust clouds—even to desert sand storms—to a complete study of industrial dust and its control.

The book's immediate practicality, however, seems to be limited to those few who have the responsibility or inclination for research in such specialized fields. This statement is not intended to minimize the evident great importance of this rapidly developing science. The 555-page "Micromeritics" is available at $8.50 per copy from *Pitman Publishing Corp'n*, 2 West 45th St., New York 19.

ELECTRETS, by **Thomas A. Dickinson**, ASTE'er and author of "Plastics Dictionary", is a 32-page pocket report on the fabrication of general-purpose electrets (the electrical equivalents of permanent magnets) from plastics. Experimentation gives reason to believe that these inexpensive polarized dielectrics can satisfactorily serve in place of permanent magnets when temperature resistance of not more than 300° F. is required.

When great temperature resistance is essential, the author contends that ceramic electrets should be satisfactory when the natural strength of cobalt steel is non-essential. Experiments already reported bear out this claim.

This investigation of plastic electrets is based on the controversial assumption that electricity and magnetism are separate manifestations of power. Electrets, previously laboratory curiosities, have come to constitute a practical development in the field of nuclear physics, although not related to research on the atomic bomb.

Mr. Dickinson's report is available at $2.50 per copy from *Plastics Research Co.*, P. O. Box 345, Alhambra, Cal.

HANDBOOK FOR HORIZONTAL BORING, DRILLING AND MILLING MACHINES, an outstanding contribution to machining know-how by **The Giddings & Lewis Machine Tool Co.**, is non-technical and designed to help the man using the machine.

The division of material aids in building a visualization of the productive possibilities of the horizontal boring, drilling and milling machine. The first section on Machine Fundamentals is directly concerned with the horizontal machine—its history, construction, functions, details of machine units, installation, and machining possibilities.

Information contained in the section on Basic Operations is for the most part applicable to the general field of machining. Chapters included deal with methods of boring bar support, boring techniques, drilling applications, and milling operations; also, a summary of other operations such as facing, turning, threading, and tapping. In addition, this section covers proper machining sequence, work layout procedures, locating and alignment, speeds and feeds selection, and other subjects.

The section on Work Methods is composed of a survey of auxiliary equipment; the versatility of the horizontal boring machine; the use of precision measuring rods, dial indicators, and target gages; also, a number of tables and other useful data.

Data sheets on the latest developments in the use of the horizontal boring machine will be supplied periodically for filing in the section on Outstanding Applications. To facilitate the addition of these pages and any other supplementary information, the Handbook is bound in loose-leaf form, which permits the book to lie flat when open at any page. Illustrations are exceptionally well executed and generally serve a functional purpose, while type is large, clear, and spaced for easy reference while the user is principally engaged with other work.

This very worthwhile book is yours at $5.00 per copy from *Giddings & Lewis Machine Tool Co.*, Fond du Lac, Wisc.

ADVENTURES IN BUSINESS, edited by **Nichols Field Wilson**, is a collection of 42 examples of successful enterprises and true stories of the men and women who founded them . . . honest folks of limited capital and unlimited courage who found it possible with the American way of life to create their own opportunities and to establish businesses of their own.

This inspiring pamphlet is available at 25c per copy from *Adventures in Business, Inc.*, 112 W. 9th St., Los Angeles 15.

VAN KEUREN PRECISE MEASURING TOOLS, the 1948 Catalog and Handbook No. 34, is a 208-page volume which devotes 130 pages to engineering formulae, simplified tables for gear inspection, and discussion of many inspection problems. In addition, it catalogs the extensive line of Van Keuren precision measuring tools.

This volume embodies the results of over two years of research and presents for the first time new formulas and tables for the exact measurement of screw threads, new methods of measuring the included angle of screw threads, a list of publications of interest to gage engineers and inspectors, and reference data on trigonometric and involute functions.

Copies of this "1948 Catalog and Handbook No. 34" are available for general distribution at $1.00 ea. from *The Van Keuren Co.*, 176 Waltham St., Watertown, Mass.

ELEMENTARY MECHANICAL VIBRATIONS, by **Austin H. Church**, Prof. of Mechanical Eng'g, New York Univ., leads to an understanding of the more common vibration problems which the engineer in any field may be confronted with.

The author has assumed that the reader-engineer has had the usual courses in mechanics and calculus. In addition to covering undamped and damped free and forced vibrations, he gives careful attention to multimass and equivalent torsional systems, multimass lateral systems, and balancing.

Such advanced subjects as self-excited vibrations, nonlinear systems, and harmonic analysis are left to more comprehensive texts for the engineer who has an unusual need for such knowledge.

The 200-page book may be ordered at $3.25 per copy from *Pitman Publishing Corp'n*, 2 West 45th St., New York 19.

ELECTRIC MOTOR MAINTENANCE, by **W. W. McCullough**, of Westinghouse Electric Corp'n, is a useful manual, full of accurate information for the engineer, inspector, supervisor or student of motors.

The first section of the book deals with motor assembly, bearings, current collecting devices, and air gaps. Part Two treats insulation, while Part Three considers characteristics of induction; direct-current, synchronous, and gear motors; motor-generator sets; and electric couplings.

"Electric Motor Maintenance," a 120-page book, is priced at $2.00 per copy and available from *John Wiley & Sons, Inc.*, 440 Fourth Ave., New York 16.

North East West South
IN INDUSTRY

Directors of **The Hydraulic Press Mfg. Co.**, Mt. Gilead, O., have named **Howard M. Hubbard** as President. Most recently a consulting and development engineer, specializing on heavy power equipment, Mr. Hubbard has, in the past, served as president of The Elliott Co. and of Greenfield Tap & Die Corp'n. He served his early apprenticeship with The Bullard Co., and also holds degrees in engineering and business administration.

Minnesota Mining and Mfg. Co., St. Paul, Minn., announces the election of **J. C. Duke** as Vice-Pres. in Charge of the "3M" Coated Abrasives Div'n and **J. A. Borden** as Vice-Pres. in Charge of the Scotch Tape Div'n. Both men had been sales managers of their respective divisions.

James L. Byrom has been elevated to the post of Manager of the **Chandler-Evans Div'n** of **Niles-Bement-Pond Co.**, succeeding **Leslie McArthur**, who was recently appointed a Vice-Pres.

Earl T. McKinney has been named Supt. of Iron Foundry Operations, **A. Y. McDonald Mfg. Co.**, Dubuque, Ia. Mr. McKinney also retains supervision of the Tool and Die Dept. and Pattern Shop.

James R. Sebastian recently became Pres. and Gen'l Mgr. of **The Rapids-Standard Co., Inc.**, Grand Rapids, Mich., mfrs. of materials handling equipment. He succeeds **Lloyd C. Backart**, named to Chairmanship of the Board.

Hydro-Line Mfg. Co., Rockford, Ill., mfrs. of hydraulic and air cylinders and special machinery, has announced the appointment of **Clarence J. Smith** as Ch'f Eng'r. Mr. Smith formerly held executive positions with W. F. and John Barnes Company and the John S. Barnes Corp'n.

Dr. John T. Rettaliata, director of the department of mechanical engineering at **Illinois Institute of Technology**, will become Dean of Engineering at the opening of the fall semester. A well-known author and lecturer, Dr. Rettaliata is chairman of the Gas Turbine Division of the American Society of Mechanical Engineers.

In order to give more personal service to their customers in the South, **Dow Corning Corp'n.**, Midland, Mich., has opened a branch office at 34 North Ave., N.E., Atlanta 3, Ga. The office will be under the direction of **R. B. Ehlers**, whose broad education and experience in engineering and the chemical industry will benefit industry in the area.

Rodney B. Campbell, well-known hydraulic design engineer, has joined the **Lynn Co.**, Burbank, Cal., as Ch'f Hydraulic Eng'r.

W. K. Millholland, Jr. has succeeded his late father in the management of the **W. K. Millholland Machinery Co.**, Indianapolis, sales representatives and mfrs. of special production machinery.

Recent changes at **The Bridgeport Safety Emery Wheel Co., Inc.**, Bridgeport, Conn., resulted in **Henry F. Kalweit**, formerly Controller, becoming Pres.; **William G. Schultz**, Vice-Pres. in Charge of Sales and the Mach'y Div'n; and **Frank B. Laurich**, Vice-Pres. in Charge of the Wheel Div'n.

The National Bureau of Standards has announced the staff additions of **William B. Haliday** as engineer in charge of model tube construction, at Electron Tube Lab.; **Russell E. Dorrell**, electronics engineer, Electron Tube Lab.; and **Paul V. Horton**, plastics and rubber specialist, Engineering Electronics Section, Ordnance Development Div'n.

F. Dougherty

O. A. Ahlers

F. J. Stokes, founder and Pres. of the **F. J. Stokes Machine Co.**, has become Chr. of the Board and is succeeded in the presidency by **Francis Dougherty, Jr.**, previously Sec'y-Treas. Founded in 1895 for the design of machinery for automatic tabletting of pharmaceutical products, and still a leader in that field, this firm is now building equipment for fabricating from powdered metals.

Oscar A. Ahlers, a member of the Sheffield organization for 23 years, was recently elected a Vice-Pres. of the **Sheffield Corp'n**, Dayton, O.

The Midwest Tool & Mfg. Co., Detroit producers of metal cutting tools and other products, has removed its plant, manufacturing facilities, and executive offices to Upper Sandusky, O. Branch offices will be retained at 2360 W. Jefferson Ave., Detroit, and at 549 W. Washington Blvd., Chicago.

Dr. Churchill Eisenhart of the Nat'l Bureau of Standards has been elected a Fellow of the **Royal Statistical Society of Great Britain.**

An honorary life membership in the **American Society of Tool Engineers** was recently presented to the President of the **Institution of Production Engineers** in England, by the ASTE's special emissary, **James Y. Scott**, Pres. of Van Norman Co., and Morse Twist Drill Co.

The Bridgeport-Diamond Machine Co., 2362 Main St., Stratford, Conn., has been formed to manufacture face grinders in various sizes using segmental wheels up to 66" dia., also vertical surface grinders, and shear blade grinders. President of the company is **John T. Kilbride**, formerly Pres. of Bridgeport Safety Emery Wheel Co. The new firm has fully acquired the **Diamond Machine Co.** of Philadelphia from the **American Eng'g Co.**

W. R. Hough, Reliance ch'f eng'r since 1945, has been elected Eng'g Vice-Pres. of **The Reliance Electric & Eng'g Co.**, Cleveland, O. **C. Richard Newpher**, for the past two years production mgr. of the Ivanhoe Div'n, has been made Div'n Mgr.

The election of **Walter E. Remmers** as Pres. of **Electro Metallurgical Co.**, and other associated units of **Union Carbide and Carbon Corp'n**, was recently announced. He had been V. P. since April, 1945. Also announced was the election of **Dr. A. B. Kinzel**, one of the outstanding American scientists, as Pres. of **Union Carbide and Carbon Research Laboratories, Inc.**

I. P. Smith has been elevated from Pres. to Chairman of the Board by **The Hettrick Mfg. Co.**, Toledo, O. Succeeding as Pres. is **W. I. Smith**, formerly Exec. Vice-Pres.

Dr. Robert J. Anderson, 125 N. Portage Path, Akron 3, O., has resumed his consulting engineering activities, specializing in the metallurgy of aluminum and magnesium.

The **Bjorksten Research Laboratories** have added a patent department to the organization. Activities will be headed directly by **Dr. Johan Bjorksten** who is registered to practice before the Patent Office; **S. Jackson**, attorney, has joined the department; and **Foster York**, Chicago chemist and patent lawyer, has been retained as counsel.

COMING EVENTS

June 21-26. AMERICAN SOCIETY FOR TESTING MATERIALS, Annual Meeting and Exhibit, Detroit.

June 26-Sept. 11. INTERNATIONAL INDUSTRIAL EXPOSITION. Million Dollar Pier, Atlantic City.

June 28-July 1. ANNUAL INDUSTRIAL FINISHING EXPOSITION AND CONVENTION, sponsored by American Electroplaters' Society. Convention Hall and Ambassador Hotel, Atlantic City.

Sept. 13-17. AMERICAN INSTRUMENT FAIR and Conference, sponsored by Instrument Society of America. Convention Hall, Philadelphia.

Fred J. Heid, formerly sales vice-pres. at Verson Allsteel Press Co., Chicago, is now associated with **Ekstrom, Carlson & Co.**, Rockford, Ill., as Gen'l Sales Mgr.

Ross Operating Valve Co. has moved into new and larger quarters at 120 E. Golden Gate, Detroit.

W. H. Rowand, member of the engineering staff for 19 years, has been named Ch'f Eng'r of **The Babcock & Wilcox Co.**, New York.

The executive and general offices of **Independent Pneumatic Tool Co.** ("Thor" products), previously at 600 W. Jackson Blvd., Chicago, have been transferred to the company's new administration building adjacent to the main works, Aurora, Ill.

Reed Rolled Thread Die Co., Worcester, Mass., will be represented in Northern N. J. by **Fred E. Duerre** of the **Production Tool Sales Co.**, 2 No Dean St., Englewood, and in Metropolitan New York and Southwestern Conn. by **Edward F. Galvin** of the **Tool Sales Co.**, 224 E. 38th Street, New York 16.

Hanna Eng'g Works, Chicago mfrs. of pneumatic and hydraulic cylinders, valves and riveters, have opened a direct factory office in Detroit at 1609 Industrial Bank Bldg., with **Frank A. James** and **W. J. Renaud** as representatives. Hanna will be represented in the New England states by **John Furey**, 264 West Brimfield Rd., Wethersfield, Conn., and in Southern Ohio by the **Scott Equipment and Eng'g Co.**, 612 Imo Drive, Dayton.

U. S. Electrical Motors, Inc., is more than doubling in size its Atlantic plant at Milford, Conn. When completed, all U. S. motors used east of the Mississippi will be built here.

Weddell Tools, Inc., Rochester, N. Y., mfrs. of inserted blade metal cutting tools, are being represented in Mass., R. I., Vt., N. H., and Me. by the **Walter E. Winfrey Co.**, Cambridge, Mass.

Paul Hawkins, with the sales organization of **The Monarch Machine Tool Co.**, is in Europe for a six-months special assignment, which includes representing his company at London's Olympic Fair in August.

Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Cal., has acquired the complete line of Parker power shears and the Multi-Max punch presses, previously manufactured by **Parker Mfg. Co.**, Santa Monica, Cal.

R. C. Ochs has been announced as Sales Mgr. of the **Saginaw** (Mich.) **Dynamatic Devices Div'n, Eaton Mfg. Co.**

Donald L. Herr, formerly Lt. Comm., U.S.N., in charge of the U.S. Naval Shipyard surge project at Terminal Is, Cal., has joined the **Allen-Bradley Co.**, Milwaukee, to develop servo-mechanisms for machine tool applications.

Omar V. Greene was recently promoted to Mgr. of Product Development by **Carpenter Steel Co.**, Reading, Pa., and **H. Sturgis Potter** was advanced to Sales Mgr. for all Reading products.

A. Milne & Co. have added tool steel warehouses at New Britain, Conn. (172 Stanley St.) and Cleveland, O. (11110 Avon Ave.), and consolidated their Pittsburgh office and warehouse (1000 Constance St., N.S.).

James L. Byrom has been elevated to the post of Manager of the **Chandler-Evans Div'n, Niles-Bement-Pond Co.**, succeeding **Leslie McArthur**, who was recently appointed a Vice-Pres.

Andrew A. Priest, formerly in management positions with General Electric, Westinghouse, and R.C.A., has been appointed Factory Mgr. of the **Instrument Div'n, Thomas A. Edison, Inc.**, West Orange, N. J.

Roy F. Cratty, well-known Rockford, Ill. industrial advertising man, recently with Greenlee Bros. & Co., is now associated with the industrial advertising div'n of **The Cramer-Krasselt Co.**, advertising agency of Milwaukee, Wisc.

Jay Creswell, Pres. of **Pneumatics, Inc.**, Plymouth, Ind., has purchased all of the capital stock of the **Anker-Holth Mfg. Co.**, Port Huron, Mich. It is understood that Mr. Creswell is in the market for other firms manufacturing components of complete air and hydraulic control circuits. Present distributing organizations will be retained.

The **Greenfield Tap and Die Corp'n**, Greenfield, Mass., mfr. of taps, dies and gages, has purchased the **Ampco Twist Drill Corp'n**, Jackson, Mich., mfr. of twist drills, reamers and end mills. **Frank J. Sikorovsky** will continue as Pres. and Gen'l Mgr. of Ampco and has been elected a Director of Greenfield. No changes are planned for Ampco sales and production.

Reypo Corp'n has consolidated their main office and factory in a new building at 5751 W. 98th St., Los Angeles 45, permitting an expansion of operation. The new 15" Reypo Drill Presses are now being introduced to the market.

Girard Associates, said to represent leading manufacturers of equipment for the basic metal working industries, has been formed to specialize in sales and engineering related primarily to the forge and press shop field. The new firm, headed by **Harry L. Showalter, Jr.** who has extensive experience in this line, will maintain principal offices in Philadelphia and Chambersburg, Pa., and will operate in the states of Pa., Md., N. J. and Dela.

Federal Tool and Mfg. Co., mfr. of short run stampings, recently moved into their new, modern plant at 3600 Alabama Ave., St. Louis Park, Minneapolis 16. The tripled floor space, increased employment, and new equipment enables Federal to greatly extend their services.

"Design" of Fort Wayne, Ind., after a number of successes in this field, has announced a special design service for the change-over from ferrous to aluminum castings—sand or permanent mold—complete from product design through the actual foundry work. Assembly work or machining of the castings before delivery are also offered by facilities in the same area.

The Chicago offices of **Allen-Bradley Co.**, mfr. of electric motor controls, have been relocated in new and larger quarters at 445-447 No. LaSalle St., Chicago 10. **J. McC. Price** is District Mgr.

The Tri-Line Corp'n, 170 Franklin St., Buffalo 2, N. Y., has been formed to handle area distribution and field engineering on resistance welding equipment produced by **Progressive Welder Co.**, Detroit, and the air and hydraulic equipment formerly represented by **Industrial Equip. Co.** of Buffalo. **C. C. Tiedman** and **G. H. Schliecker**, who were partners in Industrial Equipment Co., have become Pres. and Vice-Pres. of the new firm. Branch offices will be maintained at Rochester and Syracuse.

Frank R. Palmer, formerly vice-pres. in charge of sales, has succeeded **J. Heber Parker** in the Presidency of **The Carpenter Steel Co.**, Reading, Pa. Mr. Parker becomes Chr. of the Board and will remain in active charge of company policies. Mr. Palmer, co-author of the widely used textbook "Tool Steel Simplified", after graduating in chemical engineering from Univ. of Pennsylvania, started with the company 31 yrs. ago as foreman of the electric furnace melting department, and later held responsible positions in metallurgy, advertising, and sales.

At the recent annual meeting of **John H. Graham & Co., Inc.**, New York, mfrs. representatives, the following officers were elected: **Harold S. Graham**, Pres.; **G. W. Eckhardt**, Vice-Pres.; **G. A. Graham**, Sec'y; **M. A. Nixon**, Ass't Sec'y; **S. L. Goldsmith**, Treas. The President had just returned from Colombia, S. A., where he contacted many of the company's customers. A similar trip to Mexico and Cuba was recently made by Victor M. Streicher, Export Mgr.

The recent Annual Meeting of the **E. W. Bliss Company**, Detroit press mfr., resulted in the reelection of all Directors and the addition to the Board of **D. Lyle Fife** of Detroit, president of the Fife Electric Supply Co., and prominent in local civic organizations.

Curtis A. Gordon, formerly supt. of Wickwire Spencer Steel Div'n, Colorado Fuel and Iron Corp'n, has been named Gen'l Works Mgr. of **Jessop Steel Co.**, Washington, Pa.

Eugene W. Fuller has been elected Vice-Pres. of **Shakeproof, Inc.**, a division of **Illinois Tool Works**, and mfr. of standard and special industrial fastening devices. Mr. Fuller has been with the organization since 1928.

TOOLS OF TODAY

Precision Boring with Solid Cemented Carbide Bars

Boring bars, made of solid cemented carbide, are currently opening up new channels for reducing costs, improving accuracy, increasing tool life and controlling surface finish. To a considerable extent, this enhanced performance is due to the greater rigidity of the cemented carbide as compared to conventional steel shanks and bodies. Thus, precision boring with comparatively small-shanked bars is possible when boring holes up to 8:1 diameter to length ratio.

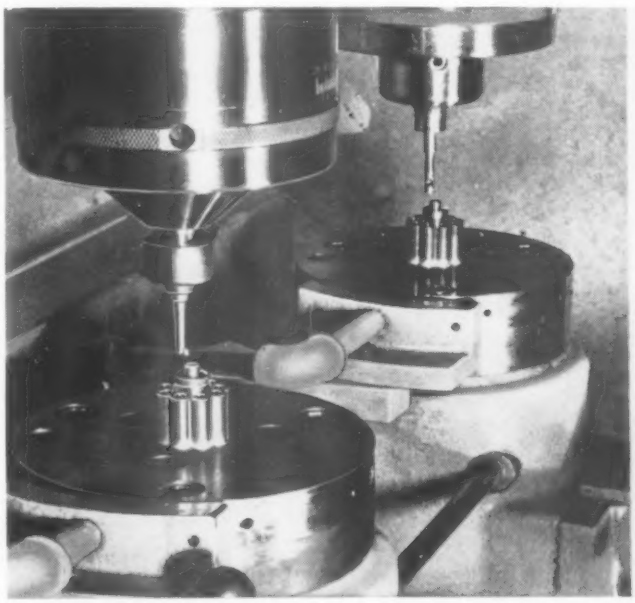
These boring bars, a development of the Carboloy Company, Inc., 11177 E. Eight Mile Rd., Detroit 32, possess the advantage that the carbide absorbs and dampens vibration, this alone resulting in reduced chatter with consequent increased tool life and improved finish. Another advantage is that the innovation provides for use of more wear resisting grades of carbide, for the actual cutting, than is ordinarily possible with the less rigid steel boring bars.

These characteristics of cemented carbide have led to new designs in new and completely automatic machines for precision boring—as, for example, the boring wrist pin holes in aluminum pistons. The combined length of holes is 5.8 times hole diameter, and the holes are "through" bored, from one side, as compared to the previous method of first drilling and then precision boring on double-end machines. Output, with the new method, is at the rate of 288 pistons per hour.

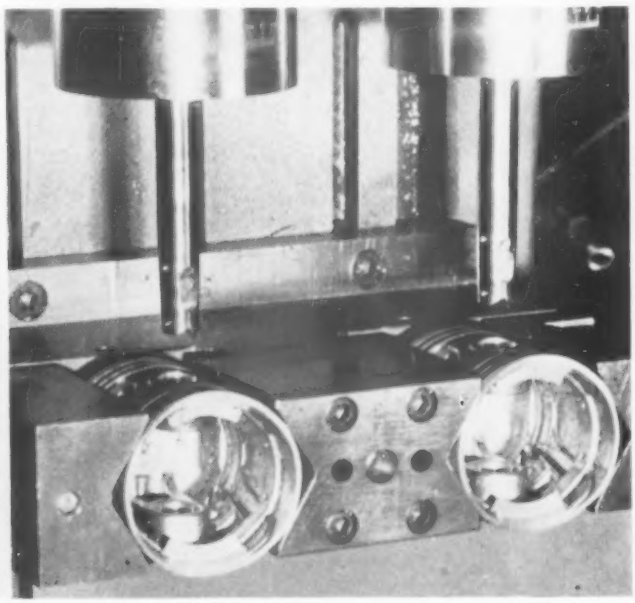
As manufactured by Carboloy Company, the bars are made of cemented carbide, Grade 44-A, with the shank end ground to fit chucks or adapters, and the balance ground slightly smaller. The cutting tools, of a harder grade—as Grade 999—or to suit the material being cut, are then brazed to the bar with Easy-Flo. Thus, to all practical purposes, the tool is solid cemented carbide throughout.

In addition to the boring of pistons, as described above, these tools are said to have effected marked economies on other precision boring jobs—as, for instance, boring multiple holes in hydraulic pump bodies having a length to diameter ratio of 6:1, with working tolerances held to .00005". **T-6-1**

Multiple holes, in hydraulic pump bodies, are bored to .00005" tolerance as compared to .0002" with previous tools.



Wrist pin holes, in aluminum pistons, are "through" bored with solid cemented carbide boring bars. Rate, 288 pistons per hour.

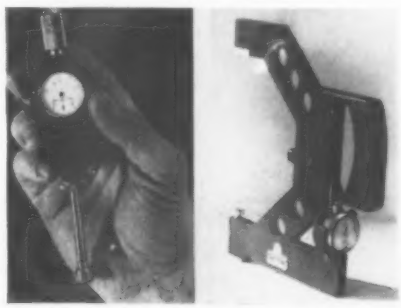


New Gages by Nilsson

Among the important new developments in precision instruments is the Nilco Dial Snap Gage (shown at right in the photo), by Nilsson Gage Co., Inc., Lake St., Poughkeepsie, N. Y. The framework of the gage is machined from rolled magnesium, with angles at 45° to provide the rigidity not ordinarily found in conventional type circular structures.

Another feature incorporated in this gage is the use of vernier type adjusting stud, which permits ¼" adjustments to be made in the gaging pin or movable anvil. The adjustment may be locked, with the gaging pin still remaining free for checking.

Also, by Nilsson, is the new **Dial Bore Gage** (shown at left) which weighs only about 8 oz. and has a dial graduated in .0001" (total movement .008"). Three of these instruments will cover a range from ⅜" to ⅞", larger bores being covered by other models.



A very fast yet simple method is used to set these gages. The head is inserted in a master gage, then the spring tensioned range extension is released while in the master as the gage is tilted at a slight angle. One twist of the locking sleeve then automatically locks the range extension located at the bottom of the head. **T-6-2**

For Further Information on Any Tool of Today, Use Inquiry Form on Page 75

"Strong Finger" Grip

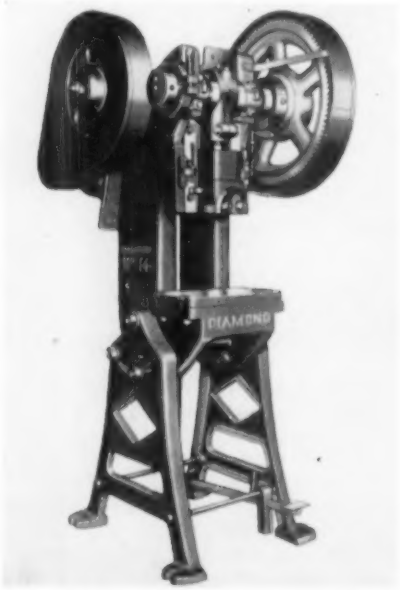
A gripping device for sheet metal and called the "Strong Finger Grip," by Merrill Brothers, Maspeth, N. Y., permits the handler to grip onto a sheet and extract it from a pile and to drag it where wanted.

Designed on the 2-way wedge and lever fulcrum principles, the device is said to grip solidly until released—the harder the pull, the tighter the grip. The tool is 6″ long, 3½″ wide, weighs 28 ounces and is provided with a handle bar which permits carrying or pulling between the first and second fingers.

T-6-3

Small Geared Punch Press

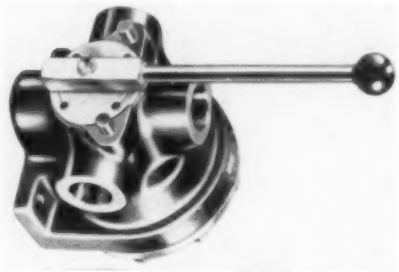
Claimed to be one of the smallest of back geared punch presses is a 14-ton open-back inclinable Geared Press, announced by the Diamond Machine Tool Company, 3429 E. Olympic Blvd., Los Angeles 23, Cal. Advantages claimed for using a geared press rather than a plain press in this small size include: Approximately 50% less strokes per minute; delivery of rated tonnage over longer length of ram travel; operations with extra long strokes; operations with drawing dies, forming dies and in blanking operations where a large amount of shear is required.



Specifications are as follows: Maximum strokes per minute, 65; standard length of stroke, 2 inches; maximum length of stroke to order, 4 inches; bed area, 8 × 15 inches; shut die height on No. 14-A is 7″ and on No. 14-B is 9 inches. These presses have a non-repeat single trip mechanism. **T-6-4**

Heavy Duty Selector Valve

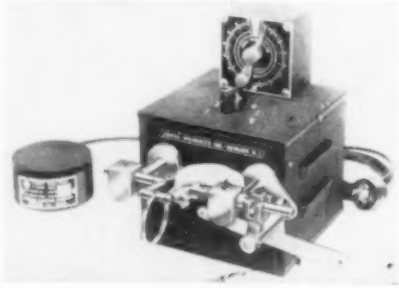
A 1½″ heavy duty 4-way Selector Valve—No. 8298 by Saval Company, 1915 E. 51st St., Los Angeles 11, Cal.—features low handle load, ball bearing construction, rugged stops and balanced detents for all three operating positions. A force of only 35 pounds on the 12″ handle is said to actuate the valve at 5000 psi pressure.



Designed for heavy duty service with water, oil or gas, this valve is not critical to dirt because foreign materials are wiped away instead of lodging between surfaces, has only one basic moving part and may be serviced without removing from lines. **T-6-5**

Production Soldering Tool

A bench type soldering machine, by Joyal Products, Inc., 12 Grafton Ave., Newark, N. J., is designed for production soldering on light work, and may also be used for annealing and hardening small parts. Spring-action, interchangeable electrodes hold the work during the brief interval of soldering and cooling.



While the machine operates by foot switch, an automatic cut-off timer regulates the soldering time. Thus, when the correct heat has been selected, heat, time and holding pressure are said to be maintained uniform regardless of how long the foot switch is depressed.

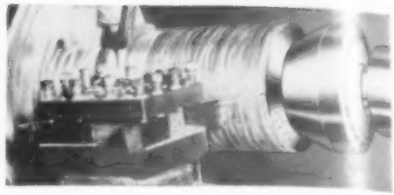
T-6-6

A Correction

An unfortunate typographical error occurred in the editorial comment on the Hoglund Contour Wheel Dresser, manufactured by the Hoglund Engineering Company, Inc., 697 Selfmaster Parkway, Union, N. J. As published, it was implied that accuracy of the tool is .002″, whereas accuracy of this wheel dresser is said, by the manufacturers, to be better than .0002″. We regret the error and are glad to make this correction.

The Editors

T-6-7



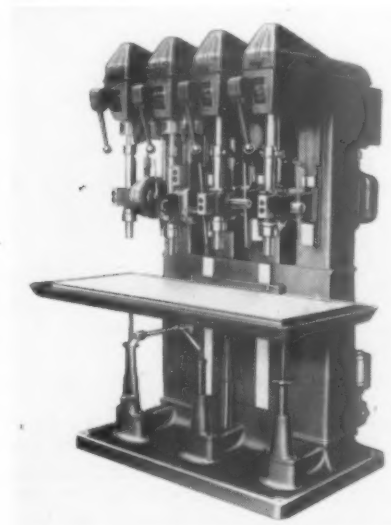
Centers for Tube Turning

Special Live Centers adapted to tube turning, announced by Sturdimatic Tool Company, 5220 Third Ave., Detroit 2, are available in sizes 1⅞″, 2⅜″, 2¾″ and 3¼″ diameters. Standard shank centers with Morse tapers are carried in stock; other sizes, taper and blunt nose type built to specifications. Features of these live centers is a low overhang and a slight cushioning action that is said to compensate for expansion due to heat, shock and excessive thrust loads. Large thrust bearing takes all thrust load, large radial bearing takes only radial load. **T-6-8**

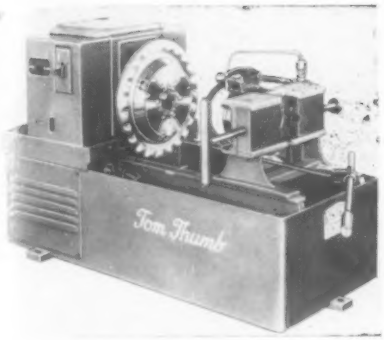
6-Speed Avey Drill

The Avey BMA-6, by the Avey Drilling Machine Company, Cincinnati, Ohio, features six speed changes through selective and sliding gears. Operating on automotive gearshift principles, speed change is controlled by a single drive located within easy reach of the operator immediately in front of each spindle head. Accurately processed gears are shaved, hardened and lapped.

Other features include constant speed motor drive to each spindle, with Vee belt drive from gear box to spindle. In addition to carrying practically full horsepower from motor to job, this final drive also increases speed and provides shockless sensitivity in drilling.



The machine shown is a 4-spindle tool, with 12″ overhang. The first spindle is Avey-matic feed. The second spindle is plain power feed, the third hand feed, and the fourth spindle is used for tapping, reversing the motor. Furnished in two models—the No. 2BMA-6, with capacity ⅞″ in cast iron, and the No. 3BMA-6, with capacity 1¼″. **T-6-9**



Portable Threading Machine

Designated as "Tom Thumb" No. 582, a portable, electrically powered Pipe and Bolt Threader, by Oster Manufacturing Company, 2085 East 61st Street, Cleveland 3, Ohio, has a range of ¼" to 2" pipe. Extra range takes ⅛" pipe and, with special drive shaft, 2½" to 8" pipe. Bolt range is ¼" to 1½" pipe.

Nipples as short as 3½" in the 2" size can be threaded both ends without use of a nipple chuck, and pipe or studs as short as 2½" can be threaded one end. A "Spinfast" chuck voids need of a chuck wrench, and the die head is a quick opening, adjustable floating type with top opening to permit view of thread being cut, and bottom opening for chips to fall into pan. While designed for bench mounting, the tool can be furnished with a stand provided with 16" wheels for easy portability.

T-6-10

Ray-Man Vee-Belt

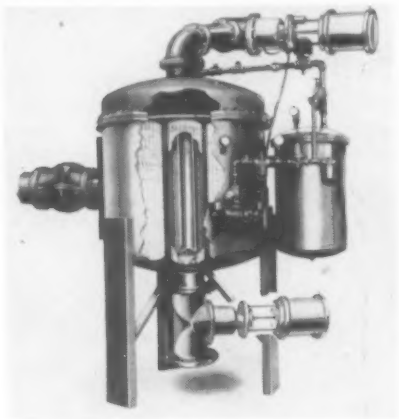
Announced by Raybestos-Manhattan Company, Inc., Passaic, N. J., is the addition of the Ray-Man Vee-Belt to the company's line of industrial rubber products. This belt was developed to meet a need for a belt particularly applicable to severe drives and includes added features of oil, heat and static resistance. **T-6-11**

Carbide Tipped Center Punch

A carbide tipped, automatic Center Punch—Model C-20, by Vinco Products, 326 Bond St., Asbury Park, N. J.—is said to permit routine marking on materials that would immediately dull ordinary steel punches. As, for example, center punching steel parts hardened to Rockwell C-60. The tool is 4" long, weight 1½ oz. and contains a spring-actuated hammer which may be adjusted between 8 and 20 pounds. A "shock absorber" action cushions the blow to prevent shattering of glass and other fragile materials **T-6-12**

Automatic Clarifier

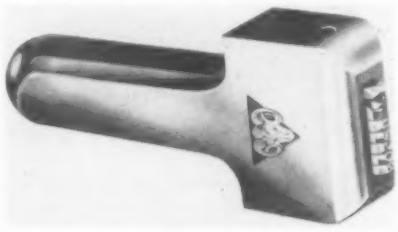
Increased tool life, elimination of individual pumps and motors, better finish with fewer rejects, elimination of hand labor required to clean machine tool sumps and lines, and better control of dermatitis are among claims made by Honan-Crane Corporation, 676 Wabash Ave., Lebanon, Ohio, for its Automatic Clarifier.



This unit is designed to remove abrasives and other contaminations from water soluble coolants used in metal working equipment. In operation, coolant is filtered under pressure through mesh screens of Monel "Dutch" weave wire cloth which provides screens of 250 to 496 mesh. As the particles build up they form a porous coating which, it is claimed, makes it possible to remove particles as small as 5 to 10 microns. **T-6-13**

Handy Stamp Holder

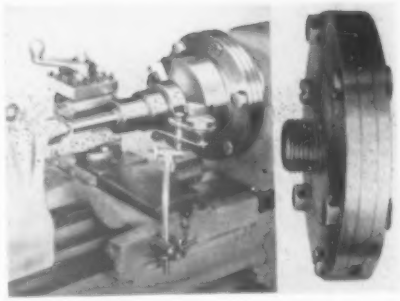
A handy Steel Stamp Holder, announced by the Acme Marking Equipment Co., 8030 Lyndon, Detroit 21, can be used for marking parts where it is undesirable to stock a quantity of different stamps and where information to be stamped may be altered from time to time, as in short production runs and model changes.



The unit shown is designed for hand use, but is also available with press shank for machine operation. Several characters can be marked at once, with uniform spacing and alignment. The type inserts are interchanged by simply loosening and tightening a set screw, and are held firmly in place.

The stamp comes in a complete kit with choice of figures only, letters only, or a combination of both, and in a complete range of sizes with slot lengths of 1", 1¼", 1½", or 2". Type sizes accommodated from 1/16" to ⅜" high.

T-6-14



Automatic Truing Attachment

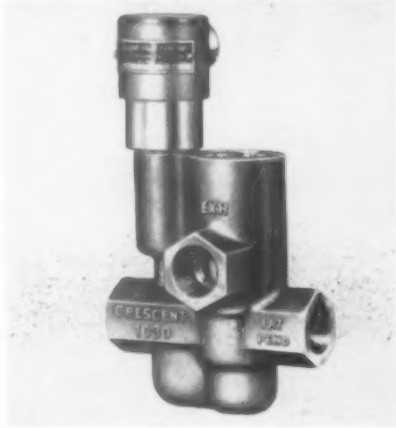
An automatic truing attachment for lathes, by the Chas. E. Chapin Company of East Rutherford, N. J., is designed for use with universal self centering and independent jaw chucks, face plates and special fixtures. The attachment is said to quickly provide concentricity as low as .0001".

As may be seen from the photo, the Auto-Truer—as it is called—consists of a front and a back plate slotted and keyed to move at right angles to each other over an intervening plate. The back plate is threaded to fit the spindle nose, and the front plate is threaded to receive the chuck. Truing is by means of a follower contacting the work under pressure until it is slightly off center, then backing away until the indicator reads zero. The plates are then locked to prevent shifting. **T-6-15**

Solenoid-Controlled Valve

A fast-acting, pilot-actuated, solenoid controlled 3-way Valve for use with air, water and light oils is announced by Crescent Valve Company, 6073 State Street, Huntington Park, Cal. Designated Model 1030 and designed for pressures from 25 to 140 psi, this valve is said to function at any speed of practical value and is available for either "normally open" or "normally closed" operation.

Model 1030 may be converted to a straight-way shut-off valve by plugging the exhaust port, mounts directly on pipe line, and may be completely disassembled without disconnecting piping. Sizes range from ¼ to 1¼ inch, and all valves are supplied with small screw-in type solenoids which are available to operate on any standard voltage, either A.C. or D.C. **T-6-16**

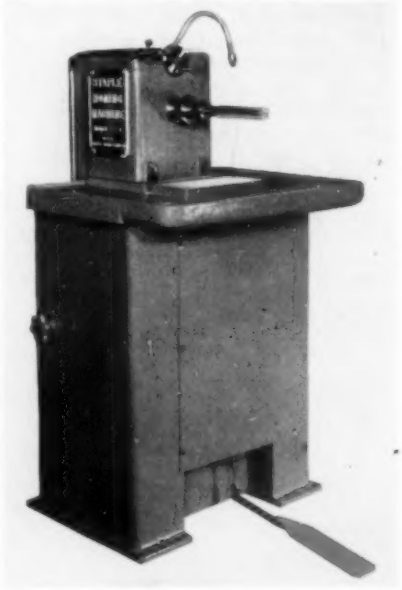


Air Filter and Lubricator

A combined Lubricator and Air Filter for compressed air lines—the Lubri-Filter, by Jarrett Compressor & Equipment, Inc., 275 Central Ave., Newark 4, N. J.—is designed to protect air driven equipment against breakdowns due to dry running or impurities in the air supply.

Air is cleaned automatically by a permanent type cleanable filter element, and atomized oil is automatically injected into the air line in required amounts named. Of aluminum and brass construction, the Model 605 Lubri-Filter, as it is named, is said to provide unrestricted air flow of ¼" I.P.T. **T-6-17**

Production Honing Machine



Added to the line of honing machines by the Staple Engineering Co., Birmingham, Mich., is the Model B-3 Honing Machine, designed to hone parts having inside diameters ranging from ¼" to 4". A machined surface is provided on which holding fixtures may be mounted and, for production work, the parts are held in a fixture and stroking is by hand. For tool room work or when honing small lots, the work is generally held and stroked by hand.

Spindle drive is by a ½-HP motor through a variable speed drive. When using a 1200-RPM motor, spindle speeds are variable from 300 to 980 RPM and with a 1750-RPM motor, spindle speeds are 490 to 1480 RPM. **T-6-18**

Manual Welding Equipment

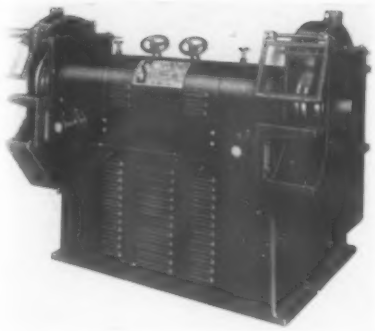
The Manual Lincolnweld, by the Lincoln Electric Company, 12818 Coit Road, Cleveland 1, Ohio, is designed to increase the versatility of the hidden arc process by providing simplified, flexible and maneuverable welding equipment in what may be termed a "packaged unit."

The equipment as shown is a self-contained, portable unit for semi-automatic welding and provides all necessary welding current and auxiliary power plus automatic wire feed mechanism, and controls. The basic element is a standard 600-ampere welder suited to straight manual as well as semi-automatic welding. Mounted on this is a compact unit containing the wire reel, feed mechanism, drive motor and voltage controls. A special cable, to which is attached the welding gun, completes the equipment.

This gun, of cone-shaped aluminum, holds 3½ lbs. of flux which is dispensed, by gravity through a hardened nozzle, in sufficient quantity to cover the arc as the weld is made. The nozzle also introduces the welding current to the wire and straightens the wire (5/64" diameter) as it is fed through. **T-6-19**

Décorative Die Inserts

Die inserts, for marking or decorating parts produced by injection molding and die casting, and now available from New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7, permit incorporation in die assemblies of lettering, numerals, trade marks, instructions, or ornamental designs on both plastic and metal parts. The inserts are said to effect economies not possible when such information is made an integral part of the die. **T-6-20**



Two-in-One Snagging Grinder

The No. 35 twin-motor variable speed Snagging Grinder, by the Standard Electrical Tool Company, 2499 River Road, Cincinnati 4, Ohio, has been redesigned for greater output and operation convenience. The No. 35 is a 2-in-1 machine in which each operator is entirely independent of the other in that one grinder head may be working while the other is stationary. Also, different size wheels, at either end, may run at correct peripheral speed with both ends independently controlled.

Features include an interlock, for speed control, whereby it is impossible to operate the wheel beyond its recommended speed; however, speed change can be made at random, but always reflecting the correct peripheral speed. **T-6-21**

Keyway Broach

A simple Push Broach—the Horton Kee-way Broach, by the Sloan Machine Company, 18725 St. Clair Ave., Cleveland 10, Ohio—consists of a hardened and ground body slotted for a high speed steel blade which is firmly held by a heavy locking nut.

Passes required vary with the size of the bore. Slots in the broach are numbered, passes being made successively with blade No. 1, No. 2 and so on until the keyway is completed. Capacity claimed is up to ½" wide using a standard hand operated arbor press. **T-6-22**

High-Power "Traveling" Straightening Press

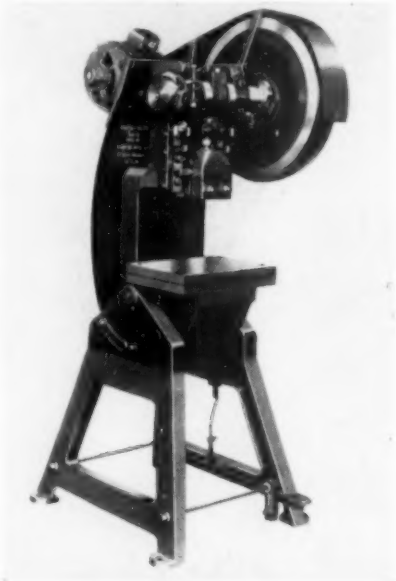
A hydraulic Straightening Press that ranks among the colossi in its field is the 200-ton unit recently announced by the Hydraulic Press Manufacturing Company, Mt. Gilead, Ohio. A unique feature of this press, which is designed for straightening weldments, castings, frame assemblies and other large area parts and assemblies, is that maximum pressure can be applied at any point within a 120″ × 38″ area of the stationary press bed.

The pressure ram is movable for 120 inches in a horizontal plane along the bed and can also be traversed for 38 inches in a horizontal plane at right angles between the two sets of strain rods. Positioning of the ram is controlled electrically by the operator at a central control station, while vertical hydraulic traverse of the ram, to and from the work, is controlled by a convenient hand lever at the control station. The exact pressure being applied to the work is shown on a dial type hydraulic pressure gauge; thus, the operator has absolute control of all factors entering into operation.

The machine as a whole is an entirely self-contained unit requiring only electrical power for operation. Oil is used as the pressure medium, with an H-P-M Hydro-Power radial variable delivery type pump generating the hydraulic pressure required for operation. Maximum ram travel is 18 inches, and maximum daylight space between the ram facing and the bed is 36 inches. Despite the high power of the tool, the hydraulic pump requires only a 5-HP motor, with drive through a flexible coupling. The entire machine, all hydraulic units and frame members included, was designed and built by H-P-M. **T-6-23**

Addition to Press-Rite Line

Sales Service Machine Tool Company, 2363 University Ave., St. Paul 4, Minn., announces the No. 12 (12-ton) press added to the Press-Rite line. In common with all presses in this line (the No. 0 excepted) this tool is built with anti-friction roller bearings in the flywheel.



Other improvements in the line include changes in the flywheels, with equalized weights throughout, positive single stroke clutches (which also permit continuous operation with automatic feeds), and a cam-actuated automatic brake. Die clearances have been increased and frames have been reinforced to minimize deflection at vital points. **T-6-24**

Bench Lathe by Sheldon

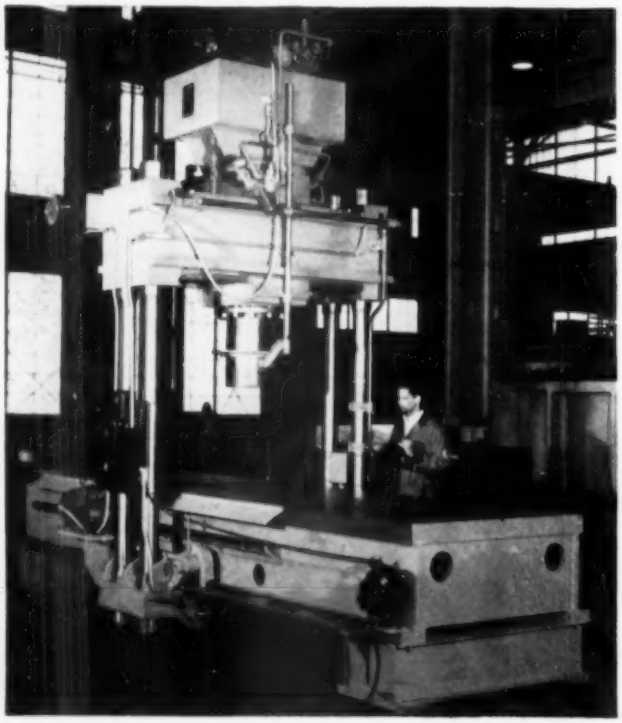
Sheldon Machine Company, 4258 No. Knox Ave., Chicago 41, has added a 10″ Bench Lathe—the L-44—to the line of 10″, 11″ and 12″ lathes. This tool, which has a 1-1/16″ hole through the spindle and integral horizontal motor drive, incorporates the basic features of larger industrial lathes.

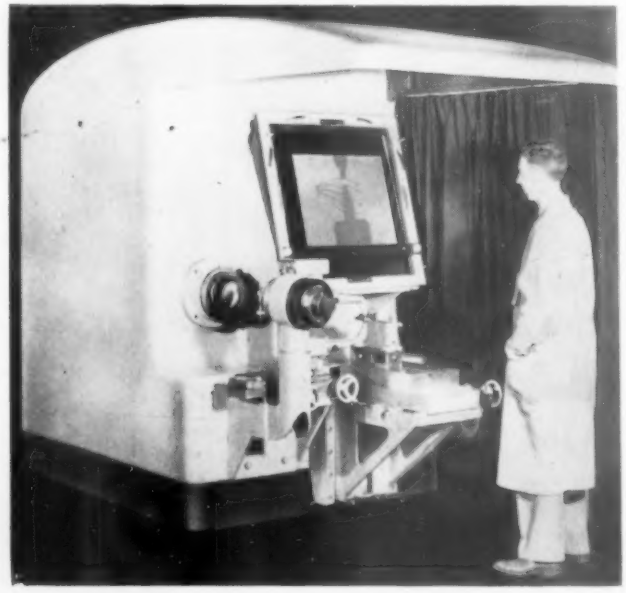
Collet capacity is ¾″ (1″ with nose-type collet chuck), tapered roller spindle bearings, double-walled worm feed apron with power cross feed, and a full quick-change gear box providing a thread cutting range 4 to 224 threads per inch. A 4-step V-belt motor drive is designed to take either a 1/3-HP or ½-HP motor. **T-6-25**

Blade Checking Comparator

As announced by Jones & Lamson Machine Company, Springfield, Vt., highly successful results are claimed for the recently designed J & L 434 m/m Projection Lens, here shown in use on a special blade checking Optical Comparator by J & L for inspecting foil contours on turbine blades.

The new lens system takes in a 6″ diameter inspection area and projects it at 5 magnifications on a 30″ square screen. The lens aperture, which has a back focal length—or working clearance—of 12½″, is 6⅝″ in diameter. The equipment includes a specially designed condensing lens as well. **T-6-26**

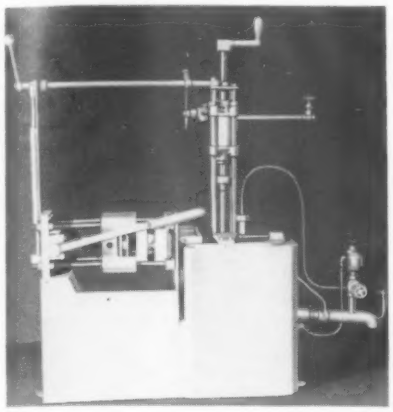




At left, the 200-ton hydraulic Straightening Press with traveling ram, by Hydraulic Press Manufacturing Company. Above, the special Optical Comparator for checking turbine blades, by Jones & Lamson Machine Company.

Die Casting Machine

The H. L. Harvill Mfg. Company, Corona, Calif. has added a small "hot chamber" Die Casting Machine—the Model AHH-1—to its rather extensive line. The new machine, which is a production model, casts zinc, lead and tin base alloys through a center gate. Opening and closing of dies, as well as ejection of castings after solidification, is effected manually. However, the machine has safety-interlock features which make it impossible to inject or "shoot" molten metal into the die cavities unless and until the dies are in closed position.

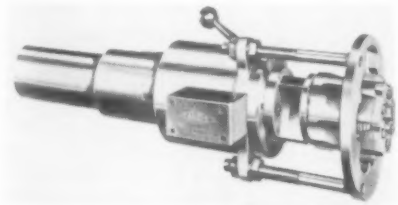


The machine is equipped with a gas burner unit (shown) requiring 330,000 BTU per hour maximum; however, an oil burning unit may be substituted. A volume of 8 cubic feet of air per minute is required to operate at its maximum rate of 500 cycles per hour.

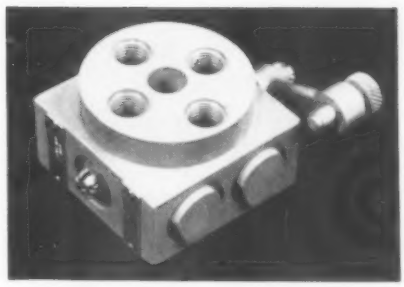
T-6-27

Receding Chaser Taps

Designed primarily for tapered threads, an improved tap—the Style LL Receding Chaser Collapsible Tap, by Landis Machine Company, Waynesboro, Pa.—is adjustable for thread length and can be used for American Tapered Pipe Threads or for any line pipe, tubing, casing or drill pipe threads listed in the A.P.I. Standards—i.e., provided they are within the diametrical diameter of the taps.



Receding action of the chasers is accomplished through a fulcrumed lever principle, the chasers receding into the tap head at a rate equal to the taper being produced. Among features is the detachable head, which permits the use of tap heads of various sizes and capacities on the same body. Thus, it is possible to cover a wide range of thread sizes with minimum equipment and reduced installation cost. **T-6-28**



4-Way Selector Valve

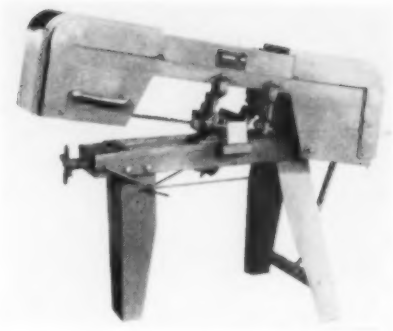
A compact 4-Way Selector Valve is offered by Electrol, Inc., Kingston, N. Y., as a simple, convenient means of controlling flow to the remote actuating cylinders of hydraulic systems. The valve consists of an aluminum alloy body, having four line connections, and includes a group of conventional, spring-loaded, balanced-type poppet valves, can-actuated and interconnected by ducts which direct the fluid to the desired channel.

Rotation of the camshaft opens the proper combination of poppets to direct the fluid through the valve to the desired location. A position stop pin prevents overrunning of the camshaft; and efficient ducting of the fluid, and reduced pressure drop, are assured by coaxial assembly and adequate passage size. **T-6-29**

Cut-Off Band Saw

A metal cut-off Band Saw—Model B, by Johnson Mfg. Company, 624 Chrysler Bldg., N. Y. 17, N. Y.,—is designed to cut off metals up to a capacity of 5″ × 10″. Wheel assemblies are mounted high on welded steel brackets bolted to the box-type frame, and the bed (7″ wide x 28″ long) is set on three point legs to avoid torsional strain.

Feed is hydraulically actuated and may be set for all types of sections, and three blade speeds—45, 90 and 150 fpm—provide suitable speeds for most materials. Wheels are fully guarded for safety, with controls within easy reach

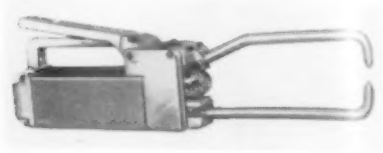


of the operator, and the machine operates and shuts off automatically.

T-6-30

Portable Spot Welder

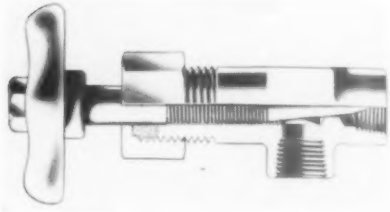
A lightweight, completely Portable Spot Welder, weighing only about 23 pounds, by Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y., may prove to be as versatile and essential as a portable electric drill.



Described as an essential tool for sheet metal and body repair shops yet ideal for production welding on a wide range of work up to ⅛″ combined thickness of metal, it is especially suited for quick welding of hard-to-get-at places and on outside work which cannot be readily carried into the shop.

Available in either 220 or 110 volt units, and with the copper arms in three lengths—6, 12 and 18 inches.

T-6-31

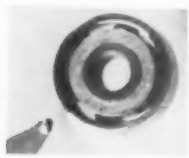


Angle Metering Valve

Offered with a micrometer-type thread on a stem provided with an unusually long taper, the Bulldog Needle Valve, by Carpenter Mfg. Company, 9523 Detroit Ave., Cleveland 2, Ohio, is designed to be opened in tenths of thousands to effect close accuracy of flow. The bodies are machined from solid bars, and the stem from stainless steel bar, to eliminate leaks due to porosity. T-6-32

Midget Size Ball Bearing

Successful production of what is claimed to be the smallest ground angular-contact (radial-thrust) Ball Bearing in the United States is announced by New Hampshire Ball Bearings, Inc., Peterborough, N. H. This rugged Micro ball bearing is of advanced, non-separable design, with a machined, solid bronze retainer carried by the ground lands of the inner ring. While its small size can be visually compared with the pen point, shown at lower left, actual dimensions are 5/64″ bore x ¼″ OD x 3/32″ wide, to ABEC tolerances 1 and 5.



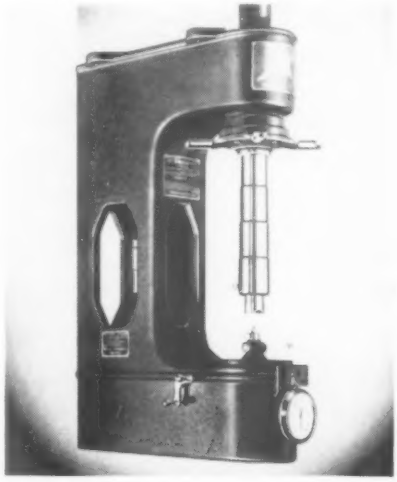
Outside of immediate uses for which this bearing is designed, there is promise of application to tools where high speeds with small diameter of rotating parts might be the important consideration. T-6-33

Hydraulic Coupling

"Fluidrive" Hydraulic Coupling, by the CraneVeyor Corporation, 1240 So. Boyle Ave., Los Angeles, Calif., incorporates cartridge mounted shaft bearings as an integral part of its construction.

Extra large ball bearings carry the combined radial and thrust loads and, in addition to insuring accurate shaft alignment, prevent end play as well and possible damage to Neoprene bellows seals, with subsequent oil leakage.

The coupling is a completely self-contained hydraulic unit, with a simple impeller element and runner. Straight radial vanes permit operation in either direction, with equal efficiency, and low impeller inertia facilities quick and shockless stops and reversing. Available in two sizes—8.5", with a capacity up to 5 HP, and 9.5", with a capacity up to 7½ HP. **T-6-34**

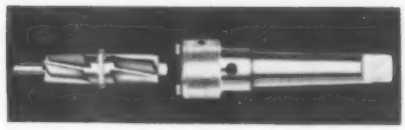


Superficial Hardness Tester

A Superficial Hardness Tester for "Rockwell" testing, announced by Clark Instrument, Inc., 10200 Ford Road, Dearborn, Mich., is especially designed for testing surfaces that must not be marred, even by the standard "Rockwell" indentation. Depth of penetration with the Clark Superficial is therefore held to limits of .005" or less.

The unit is particularly suitable for testing surface hardened steel, exceptionally thin rolled sheet metals, and can also be used for standard "Rockwell" testing of metals that are of uniform hardness throughout.

The tool is available in three models, with 8", 12", or 16" vertical capacity. Standard equipment includes a specially formed and lapped diamond cone penetrator; a 1/16" steel ball penetrator; telescoping cover for elevating screw; oil reservoir for elevating screw; standard 3½" anvil;; checking anvil; "V" anvil; raised "V" anvil; metal dust cover; leatherette cover for instrument; and test blocks. **T-6-35**



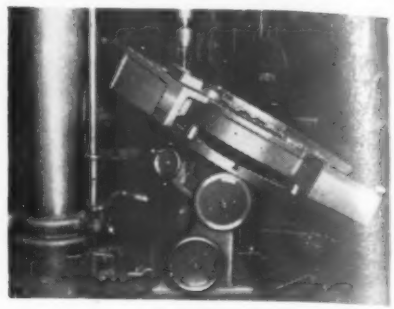
Double End Counterbore

A counterbore—the Plan-co Double End Counterbore—with cutting edges at two ends instead of just one, and announced by the Plan-O-Mill Corporation, 1511 East Eight Mile Road, Hazel Park 20, Michigan, is available in a complete range of sizes in high speed steel or with tungsten carbide inserts. Both single and multi-diameter styles are offered, with or without pilots. Two types of holders—collet and sleeve—provide for fast and easy tool replacement and furnish a positive drive with claimed runout of less than .002".

Advantages claimed are: Twice the life of single end tools with less need for high tool inventories, at only slightly more than single end tool cost, and longer operation without time out for sharpening since, when one end is dulled, the cutter is simply reversed and the other end is used. **T-6-36**

For Further Information on Any Tool of Today, Use Inquiry Form on Page 75

Compound Angle Tab



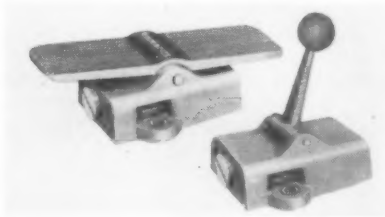
Angular drilling and boring, as well as other angular machining operations, may all be facilitated by use of the Rotab, a universally tiltable and radially indexed auxiliary table manufactured by Machine Products Corp., Detroit 12. The table illustrated is set up to bore twenty ½" holes, at a compound angle, in a fabricated base measuring 42" square, 8" through and weighing about 865 pounds, on a radial drill. T-6-37

Anti-Corrosive Coatings

Two types of Anti-corrosive Coatings, called "Zincilate," by Industrial Metal Protectives, Inc., Dayton 2, O., will air-dry without baking and are sufficiently flexible so that sheets, pipes and forms can be bent double, after coating, without breaking the protective coating. Overcoatings of enamel, paint or Wrinkle finishes may be applied over "Zincilate" after five minutes of air drying, and both coatings baked at the same time.

"Zincilate" is adaptable to production line application by dipping, spraying, brushing or roller coating, with conventional finishing equipment, and is claimed to give 20-year protection against corrosion. T-6-38

Hand and Foot Valves



Two Air Valves, one hand operated, the other foot operated, by Airmatic Valve, Inc., 1643 E. 40th St., Cleveland, O., have appeal in compact construction and design for easy mounting. Both valves, available as models HF-3 (3-way) and HF-4 (4-way) have precision machined internal parts and are designed for locking or non-locking with neutral. They are made for accurate control of small single and double acting cylinders, continuous operations, and are available in ¼" sizes. T-6-39

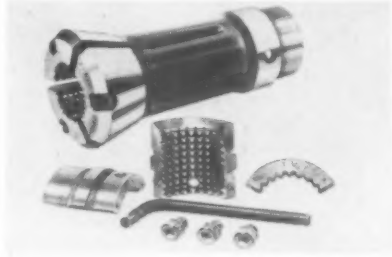
Nu-Arc AC Arc Welder

Simplified construction with increased operating efficiency features the Nu-Arc AC Portable Arc Welder, announced by Electric Arc, Inc., 152-162 Jacliff Ave., Newark 8, N. J. Completely redesigned with no moving parts, the unit is built for general-purpose use in welding shops, industrial plants, shipyards, and railroad yards. It is a complete plug-in type welding services with multiple-stage heat ranges, ready for immediate use.

Improvement in the design was made to assure uninterrupted performance of the welder by eliminating moving parts that might have to be repaired or replaced and cause delay in work. The simplified design is said to assure dependable, long working life at a minimum operating cost. **T-6-40**

Master Collet

A master collet—the Style "SM" Master Collet, by Sheffer Collet Company, Traverse City, Mich.—is provided with pads which may be changed without removing the collet from the machine. The pads are positively held by standard socket screws that lock in T-slots in the face of the collet.

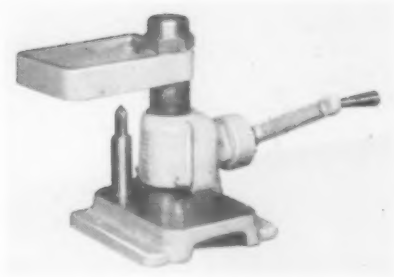


To exchange pads, it is only necessary that the collet be in open position, when the screws may be backed out and the inserts slid out or in, as desired. The collets are immediately available for all machines of 1" capacity and over. **T-6-41**

Top-Loading Jig

The Auto-Swing Jig, by A. H. Bowlzer Mfg. Co., 10130 San Vincente Ave., South Gate, Calif., features top loading and complete operation by means of one handle. Flipping the handle in one direction swings the bushing plate clear for loading; on reverse motion, the plate swings back into drilling position, securely locked and accurately located.

Range of the lock permits use of the jig on parts that vary up to $\frac{1}{4}$" in thickness, and the bushing plate is quickly detached and replaced so that the tool can be used for various work-



pieces. Suitable holding or locating nests may be screwed and doweled to the base. **T-6-42**

Brinell Testing Machine

A Brinell Testing Machine, announced by Steel City Testing Machines, Inc., 8843 Livernois, Detroit 4, is said to be capable of checking up to 800 pieces per hour of parts varying in diameter and thickness as much as ¾", without moving the elevating screw.

Identified as model KDR, the machine is motor driven, hydraulically operated and so constructed that it is impossible for the operator to remove the specimen being tested before the full load has been applied to the penetrator. The load is held for a pre-determined time cycle (adjustable from 2 to 15 seconds duration) after which time the penetrator automatically returns to starting position. A comparator indicator eliminates the necessity of using the Brinell Microscope on production testing. Throat opening is 6" and maximum vertical opening is 14". **T-6-43**

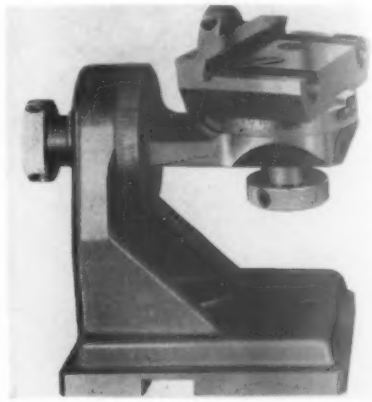
B & S Universal Grinder

In line with a policy of progressive improvement rather than radical changes, the Brown & Sharpe Mfg. Company, Providence 1, R. I., has redesigned the popular No. 13 Universal and Tool Grinding Machine to provide easier operation and broadened applications.

The machine is particularly suited to toolroom work, such as grinding small and medium-sized cylindrical work, form grinding, sharpening milling cutters, reamers and similar tools. A wide variety of attachments and additional equipment, available, further adapts the machine to include practically every type of toolroom grinding. **T-6-44**

Chaser Grinding Attachment

A Chaser Grinder—the No. 15 by Landis Machine Company, Waynesboro, Pa., is designed for inexpensive and satisfactory grinding of Landis thread chasers. It is especially intended for grinding the compound rake and lead angles of tangential chasers which are so essential to accurately formed threads.

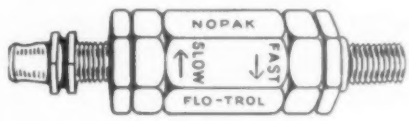


A cross arm on the base casting is arranged so that the platen, which can be rotated throughout 360° horizontally, is adjustable vertically; thus, any rake angle and any desired lead angle may be accurately obtained. Platen and cross arm are securely locked by knurled knobs.

The fixture, which can be used on all Landis chasers up to 1-¼" wide, can be readily mounted on any grinding machine which has a traversing table. The base of the fixture can be clamped to a T-slotted table or held on a magnetic chuck. **T-6-45**

Speed Control Valve

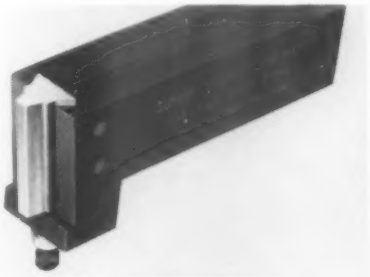
Added to the Nopak line of air and hydraulic valves and cylinders, by the Gallapd-Henning Manufacturing Co., Milwaukee 7, Wisc., is the Flo-Trol de luxe Speed Control Valve, developed to give machinery builders and users a speed valve that requires no tools for adjustment. The adjusting sleeve is readily turned and set by hand and, as claimed by the manufacturer, its simple design, solid construction and the absence of seal-packings, make it leak-proof, wear-proof and definitely maintenance-free.



The valve can be inserted at practically any point in an air or hydraulic line, where its small size and compact "in-line" design result in effective, convenient installation wherever space is limited. It may be removed or replaced any time without disturbing the piping. **T-6-46**

Special Purpose Ejector Tool

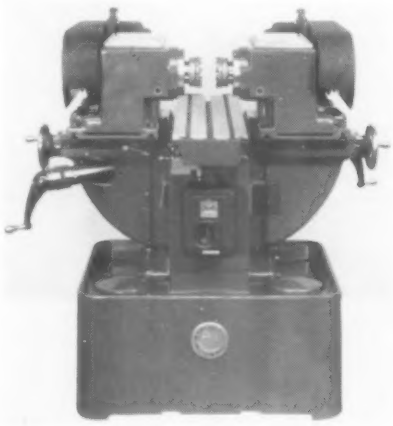
Success of the Ejector Type Tool, by Super Tool Company, 21650 Hoover Rd., Detroit 13, on conventional turning jobs has led to the development of special purpose tools, of which the one shown—for simultaneously cutting the belt track and facing the edges of V-groove pulleys—is a typical example.



While in many instances complete tool designs are submitted, the maker reports that, generally, operational details only are furnished and the designing left to the company's engineering department. **T-6-47**

Twin Miller by Nichols

The Twin Miller, announced by W. H. Nichols Company, Waltham, Mass., is a double spindle high precision milling machine designed for light duty work where two surfaces can be milled in a single pass. The machine has two opposed independent geared milling heads powered by pancake type motors, and each head is provided with 15 spindle speeds from 55 to 2080 RPM.

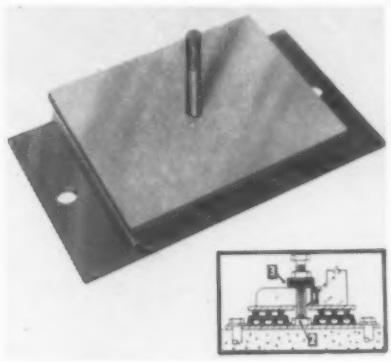


Each head is adjustable in three planes: horizontally by means of slides and set screws; vertically and transversely by feed screws with direct reading micrometer dials. Maximum height of spindle centerline above table is 12", minimum 1½". Maximum distance between spindle noses is 16", minimum 4"; however, attachments provide greater flexibility.

The 8½" × 34" table is pneumatically powered by a solenoid operated air cylinder and has 12" maximum travel with a 9" hydraulically controlled cutting stroke. **T-6-48**

Vibration Dampeners

A line of Vibration Dampeners, by Finn & Company, 2850 Eighth Ave., New York 30, are especially designed for use under such tools as precision grinders, lathes, jig borers. The series includes two types of mounts—CM-H, for horizontal and rotary vibration, and the CM-V (with built-in snubber action), for vertical vibration in top-heavy and recoil type machines.

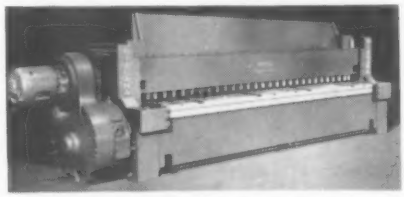


The mounts operate on the principle of "rubber-in-shear" and non-overloading characteristics. There are no rubber-to-metal bonds that may break or separate in use. Mounting is simple, as illustrated, viz: Insert the stud (1) through the cored hole, in the machine, and into the snubber unit (2) and put hold-down washer (3) in place as shown. **T-6-49**

Heavy Duty Squaring Shears

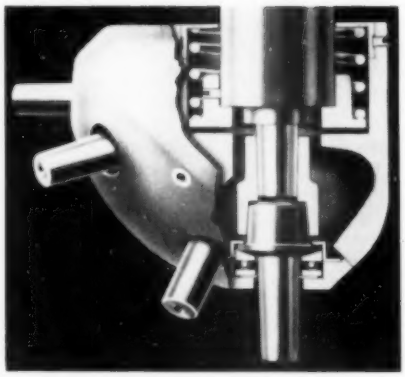
An addition to its line of Heavy Duty Underneath Drive Squaring Shears, by the Niagara Machine and Tool Works of Buffalo, N. Y., has a rated capacity of ⅝" mild steel 14' long and is designated as the No. 1214.

In common with other Niagara power shears, this tool has a rectangular box section bed and triangular box section cross head to give rigid support to the knives; this, together with the low slope of the upper knife, reduces the tendency for the sheared pieces to twist, curl or camber.



The holddown is driven by eccentrics on the crankshaft, while self-contained, individually spring-loaded feet clamp the metal during the working part of the cycle and automatically compensate for variation in metal thickness.

A parallel ball bearing self-measuring back gage can be arranged for either manual or electric operation. When motor driven, this is equipped with a direct reading indicator located in the crosshead. "Wide" and "Narrow" push buttons are located on the frame in a position convenient to the operator. **T-6-50**



Self Centering Drill Turret

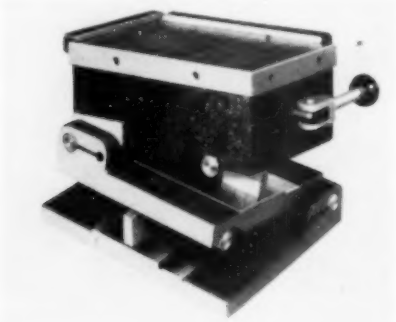
A novel automatically aligning drill press Turret—the Lign-O-Matic, by Howe & Fant, Inc., 521 (12D) Flaxhill Rd., South Norwalk, Conn.—is said to be so constructed that its six spindles are automatically centered and aligned by the drill press spindle. The accuracy of the turret is thus commensurate with the accuracy of the spindle to which it is attached.

As shown by the cutaway photo, the six spindles in the turret are mounted on specially designed floating bearings so that they are free to move angularly and laterally as well as to rotate. As the tapered driving unit (attached to the drill press spindle) engages the mating taper of the turret spindle, it centers and aligns the latter and locks it in position until the drilling operation is completed.

There are no gears, teeth or projections to clash and wear; instead, driving power is transmitted directly from the machine spindle to the turret spindle actually in operation. **T-6-51**

Permanent Magnet Chuck

The Magna-Sine, by Robbins Engineering Co., 318 Midland Ave., Detroit 3, is now available with permanent

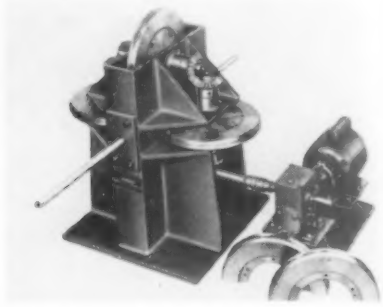


magnet as well as electric magnet chucks. The former may be used on either wet or dry grinding and machining operations, and amount of magnetic power is controlled by the amount that the handle is turned. With this chuck, parts are not magnetized when removed.

The Magna-Sine is used for set-up on inspection, tool room work and other machining operations, and angles are set up by the sine bar method using standard gage blocks. **T-6-52**

Hi-Speed Marking Device

A universal Marking Machine—the "Master Marker," by Pannier Bros. Stamp Company, 223 Pannier Bldg., Pittsburgh 12, Pa.—stamps 1, 2, 3 or 4 sides on the same run on seamless and light wall aluminum, brass and copper tubing at a rate up to 300 ft. per minute.



It also handles bars, in round, square, hexagon or other shapes, in sizes from ⅜″ to 2″. Portable or stationary, as desired, it can be used for production or job work. **T-6-53**

Improved Dustkop

Aget-Detroit Company, Ann Arbor, Mich., has added Model 11B50 Dustkop to its line of dust collectors. This unit, which is a modification of the standard Model 1150, employs a roll-a-way bin with clamp-down cover to collect and store the dust while yet permitting its easy removal to point of disposal.

The unit has storage capacity for dust collecting operations where large volumes of dust, lint and other impurities in the air are involved, and the sealed bin permits removal of the collected dust without danger of recontaminating the air as would be the case were it dumped into an open conveyance.

Suction capacity on a 6″ inlet is 1394 CFM at 3.2 static suction, developed by a 1½-HP motor. The unit is 72″ high, takes up 24″ × 40″ floor space, while the bin measures 20″ × 36″ × 21″. **T-6-54**

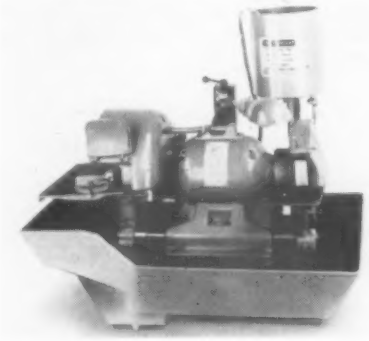
Vibrating Engraving Tool

A vibrating engraving tool has been developed by the Handicraft Division of the Burgess Battery Company, Lake Zurich, Ill., for marking and etching on steel, glass, plastics and other hard objects.

Weighing only 9 ounces, and especially adapted to long periods of use without tiring the hand, the Vibro-Graver—as the new product is called—operates by electricity and comes attractively packaged in kit form. Three attachments including a diamond point, a tantalum carbide point and a ball point—for the various types of marking—come with each kit. **T-6-55**

"Cool Wheel" Grinder

A grinder that projects the "coolant thru the grinding wheel," by Scheer Grinder Company, 5 E. Franklin Ave., Collingswood, N. J., is designed for cool grinding of carbide and hand tools. An engineered grinder and not an attachment, the tool is complete with base (containing coolant tank, settling basin and pump section) motor, adequate work tables, protractor gages and wheel guards.

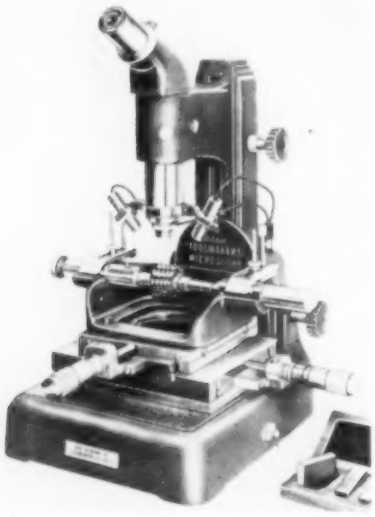


A centrifugal pump, operating in right or left hand directions, delivers coolant to a combination filter and reservoir (shown), from where it is delivered to the wheels by gravity. Coolant flow is controlled by a stop cock; thus, the wheels can be slightly moistened for delicate work, or full flooded for cast cutting without heat.

Wheels used are of porous type silicon carbide or aluminum oxide, preferably of Foraminoid structure—i. e., with the pores or holes inter-connected so that water may permeate through to the entire wheel face. However, the design further incorporates a special wheel flange that injects coolant along the face of the wheel bore evenly, centrifugal force then carrying the fluid through the wheel structure to the material at the point of grinding. **T-6-56**

Toolmaker's Microscope

The Wilder Toolmakers' Microscope, by George Scherr Company, Inc., 200 Lafayette St., New York 12, is designed to combine precision and essential features of an optical inspection tool with simplicity and low-cost manufacturing. The instrument comprises a Meehanite base, post and microscope bracket on which the 'scope is vertically adjustable by spiral rack and pinion. An additional vertical adjustment of the microscope tube, within the bracket, is provided for greater capacity, particularly when handling work between centers.



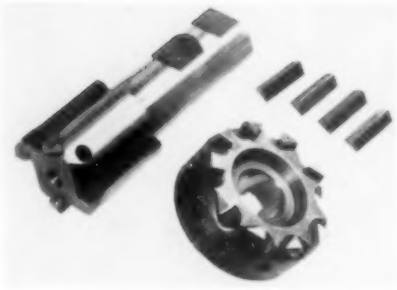
The 'scope tube provide standard magnification of 30X for the image of the work. The standard reticule in the eyepiece contains a 90° hairline and a 60° angle cross for thread checking. To facilitate the latter, the vertical post, with microscope and bracket, may be tilted to the helix angle of the thread.

Work may be laid either on the compound measuring stage or held in a center cradle that attaches to it. Measurements in two directions are by 1" heavy type micrometer screws that read diretly in .0005"; for highest accuracy, however, gage blocks may be used in both directions instead of the micrometer screws. **T-6-57**

Rolled Bronze Sheet

Use of centrifugally cast slabs for rolling aluminum bronze sheets, in preference to the more commonly used statically cast slabs, is announced by Ampco Metal, Inc., 1745 Thirty-Eighth Street, Milwaukee 4, Wis. This centrifugally cast material is said to result in a sheet that is sound, solid and uniform throughout, without slag inclusions or other flaws more or less common with the static-cast product.

The sheets are available annealed, or unannealed and specially processed for applications where wear resistance is a requisite—as, for example, in gibs, liners and similar parts in metal working equipment. **T-6-58**



3/8" Tri-Bits by Weddell

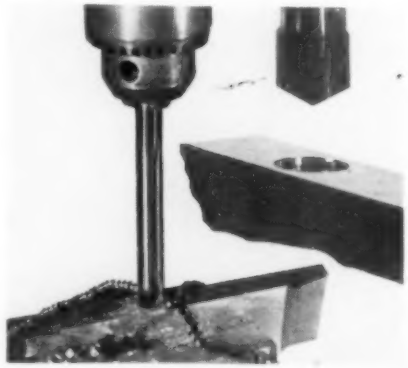
Weddell Tools, Inc., 37 Centennial St., Rochester 11, N. Y., has introduced a light duty cutter blade—the 3/8" Tri-Bit—to their line of triangular shaped cutter blades. This bit, shown applied to a small shell type face mill and solid shank end mill, is only furnished in solid carbide.

No wedges are required with these triangle tool bits, which are quickly and positively locked into a vee in the triangular shaped holes, with each bit adjustable by means of individual adjusting screws. As there are only holes in the cutter body, this is tied together all around the outside diameter.

The minimum size end mill, as shown, is 2" diameter, 3/4" bore, with 10 adjustable carbide blades. Solid shank end mills are furnished in size 1" diameter and up. **T-6-59**

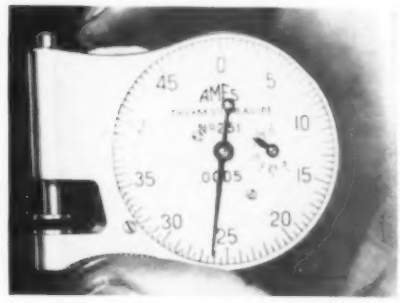
"Hi-Rockwell" Drills

While primarily developed for drilling hardened steel, a line of "Hi-Rockwell" Drills, by the Raymetal Company, Walled Lake, Mich., can be applied with equal economy to production drilling of hard or soft parts, or a combination of both—as, for example, drilling through a carburized and hardened case and continuing on through the soft core.



Among features of these drills is that they cut either dry or with coolant. Recommended range is from C-40 to C-65 Rockwell in hardened steels; therefore they can be advantageously used to drill or size "forgotten holes" in expensive dies or molds without annealing. In operation, they cut clean and true to size, curling out a chip as shown in the drilling of a hardened form tool.

Made with slow spiral and running at high speed, these drills can also be used for production drilling of alloy steels, cast iron and the various nonferrous materials. They are regularly furnished in straight shank 9/32" to 1/2", in jobbers lengths 1/16" to 1/2", and in standard wire sizes from No. 22 to 1. **T-6-60**



Improved Thickness Measure

Two .0005" graduated models, a simple "0" adjustment, and fixed parallel contacts feature the improved line of Dial Thickness Measures by B. C. Ames Company, Waltham 54, Mass. The improved models are particularly applicable to accurate measuring of tissues, cellophane, membranes, fibres, and both compressible and non-compressible materials.

The Measures weigh 1 1/2 oz., with case thickness 1/4" and contacts 1/4" diameter. A direct reading count hand permits fast reading anywhere within the 5/16" range. In addition to the two .0005" graduated models (dials reading 0-40 to 0-50) there is a .001" graduated model reading 0-100 and a metric model graduated in .01 mm, dial numbered 0-100 and with a range of 8 mm. **T-6-61**

Taper Shank Micro-Mills

Micro-Mills, by Severance Tool Industries, Inc., Saginaw, Michigan, are now available with taper shanks in sizes 3/8" and larger. It is claimed that standard internal grinding spindles or quills can be adapted for the mounting of these Micro-Mills, and that instant and positive alignment is attained as a result of mating two steep tapers and securing the tools in place with a retaining screw.

It is further claimed that bores can be sized in one or two passes and in less time than consumed by internal grinding, with finishes having comparable profilometer readings. Nine standard sizes of these tools, in the Taper Mount series, range from 3/8" to 1 1/2" diameter. **T-6-62**

Pneumatic Hammer

An improved Pneumatic Hammer—the Elgin Model "G" Utility Hammer, Ingersoll Born Manufacturing Company, Elmhurst, Ill.—delivers approximately 5000 strokes per minute with 100 pounds air pressure. Approximate consumption is 3 cu. ft. per minute.

Compactly constructed, being 8" long with bore and stroke $\frac{7}{8}$" × $\frac{5}{8}$" and weighing $3\frac{1}{2}$ lbs., the tool is primarily designed for chipping, scaling and cleaning welds, metal cutting and ripping of light metals, and similar work requiring precision at top speed. The tool is provided with trigger air control and a knurled ring that positively locks tools in the chuck. **T-6-63**

Liquid Contact Cleaner

A liquid cleaner—Rotol, by Rotol Chemical Company, 58-21 80th St., Elmhurst, L. I.—is said to eliminate the use of sandpaper or other abrasives when cleaning commutators, slip rings and other electrical contacts. The liquid is further said to be non-inflammable, does not give off poisonous fumes and leaves no residue or film that would prevent adequate contact. **T-6-64**

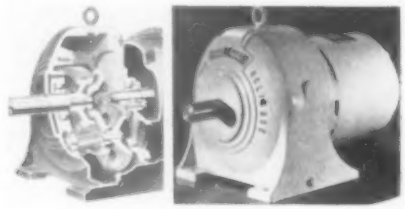
Cam-Actuated Vise

A Double Cam-Actuated Vise, by Nutmeg Tool & Products, Norwich, Conn., locks and automatically centers the work with one motion of the handle, regardless of dimensional variation, and releases the work with return motion of the handle.

Rugged in construction and said to be non-clogging and requiring no lubrication, the vise is further provided with a 3" hole through the center which permits smaller parts to drop through into a tote box. **T-6-65**

Gearmotor by Reliance

A Gearmotor with potentially important application advantages throughout diversified industries has been developed jointly by the Reliance Electric and Engineering Company, Cleveland 10, Ohio, and the Philadelphia Gear Works.



These helical-type horizontal units are complete integral AC or DC motors with flange mounting and operate in a speed range from $7\frac{1}{2}$ to 780 rpm. They are to be built in six basic sizes in capacities from 1 to 60 HP and with single, double or triple reductions.

Use of a flange-mounted motor, with shaft modified for mounting of a hardened pinion, permits many standard or special motor enclosure types to be used without expensive adaptions. Thus, enclosure types including protected open, splash-proof, grip-proof, Underwriters' groups, and Bureau of Mines can be bolted to any of the gear elements without alteration. **T-6-66**

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T-6-23 T-6-24 T-6-25 T-6-26 T-6-27 T-6-28 T-6-29 T-6-30 T-6-31 T-6-32 T-6-33
T-6-34 T-6-35 T-6-36 T-6-37 T-6-38 T-6-39 T-6-40 T-6-41 T-6-42 T-6-43 T-6-44
T-6-45 T-6-46 T-6-47 T-6-48 T-6-49 T-6-50 T-6-51 T-6-52 T-6-53 T-6-54 T-6-55
T-6-56 T-6-57 T-6-58 T-6-59 T-6-60 T-6-61 T-6-62 T-6-63 T-6-64 T-6-65 T-6-66

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ACTUAL PERFORMANCE TEST PROVES THERE IS NO SUBSTITUTE FOR V-R CARBIDES

DETAILED REPORT:

MACHINE:	14½" South Bend Lathe.
OPERATION:	Boring Fusion Cup for Calorimeter; Bore face, bottom and outside rim.
MATERIAL:	99% Nickel.
TOOLS:	¾" Diameter by 8" Long V-R Carbide Tipped Boring Tool.

COMPARATIVE PERFORMANCE.

	V-R Carbide Grade EH	Other Carbides
S. F. M.:	225	140
F. R. REV.:	.002	.002
DEPTH OF CUT:	.020	.020
PCS. PER GRIND:	20	2 to 6
REMARKS:	V-R Carbide Tipped Tools eliminated off-tolerance rejections and produced outstanding increases in pieces per grind. Quality of finish resulted in reducing polishing time from 40 minutes to 15 minutes.	

In this and in thousands of other actual machining operations V-R Carbide tools have proven their superiority in eliminating off-tolerance rejections and producing outstanding increases in pieces per grind.

Vascoloy-Ramet carbide tools and blanks are offered in an almost unlimited choice of styles, grades and dimensions to meet any industrial requirement.

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CALL your nearest V-R Branch Office today for an effective and economical solution to your production problems.

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THAT YOU GET RESULTS WITH TANTUNG®

Actual industrial reports prove that Tantung, the tough, shock-resistant, non-ferrous cast alloy performs at far greater speeds and feeds than high speed steels. In addition to permitting heavier cuts, heavier feeds, and producing more pieces per grind, Tantung is considered an excellent finishing tool and on most materials the finishing cut can be taken at least one speed faster than the roughing cut.

For courteous, experienced help in applying Tantung to your machining problems, write or call your nearest V-R Field Engineer today.

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VASCOLOY-RAMET CORPORATION WAUKEGAN ILLINOIS

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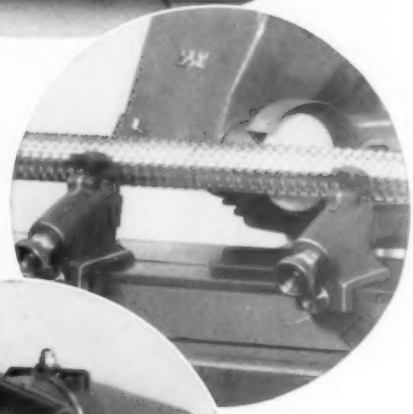
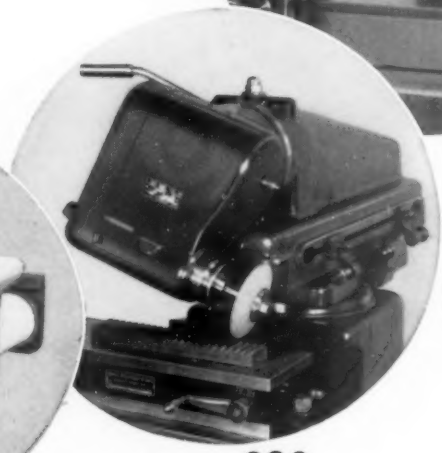
REJUVENATE YOUR BROACHES

TO ORIGINAL CONDITION

(Quick Delivery)

MODEL **FS3**
FOR
FLAT BROACHES





MODEL
RG1
FOR ROUND
BROACHES

MODEL **CS3**
A "UNIVERSAL" SHARPENER FOR
BOTH FLAT AND ROUND BROACHES

HOW TO PICK THE BEST BROACH SHARPENER FOR YOUR NEEDS

If you have only "round" broaches (cylindrical, spline, etc.) up to	You need this Sharpener
36 in. long	RG1-36
72 in. long	RG1-72
84 in. long	RG1-84
If you have only "flat" broaches (surface broaching)	FS3-36
If you have both flat and round broaches up to	
72 in. long	CS3-72
84 in. long	CS3-84

Ask for complete information by model number

....with one of these Broach Sharpeners by

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. **DETROIT 13**

BEST BY TEST

Operator's Hands Left Free for Other Work...

...EXCLUSIVE PISTON LATCH* PERMITS

Dual Control

FROM ONE TREADLE

Operator fatigue is minimized and the operator's hands left free for work requiring manual skill by using a Logan foot operated control valve.

IN NEW "LOGAN" † STANDARD

Foot Operated VALVES

(AIR AND HYDRAULIC MODELS; 4-WAY, 2-POSITION TYPE)

To elevate these heavy castings in position for the conveyor, the operator momentarily presses the treadle of the Logan foot valve controlling the pneumatic mechanism. With the valve piston latch set for *indefinite dwell,* the elevating cylinder is held at the end of the outstroke until a conveyor hook can be attached to the part. The operator then presses the pedal again to lower the platform for receiving the next workpiece.

Conventional operation may be obtained from the same valve treadle by turning the lever to place the latching mechanism in neutral. The exclusive piston latch is available in Logan foot operated valves of both air and hydraulic types. Additional advantages are as follows:

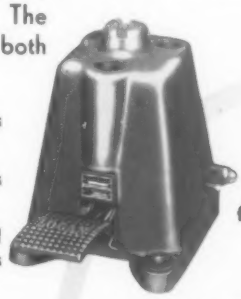
HIGHLY COMPACT—Only minimum floor space required. Valve bases range from 5 in. to 10 in. square—heights from 6¾ in. to 11¼ in.

EFFORTLESS FOOT CONTROL—Balanced piston design—valve does not operate against line pressure.

FAST, POSITIVE ACTION—Valve ports and internal chambers are full pipe size; piston is light in weight. This assures rapid response and fast reversals without excessive vibration or wear.

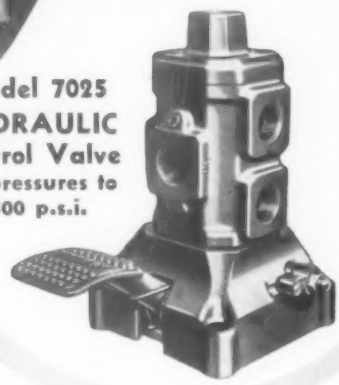
INFREQUENT MAINTENANCE—No valve seats to become worn. *Air valves* have long-life synthetic cup packings (no rod packing). *Hydraulic valves* have no packing except stem seals, subject only to exhaust pressure.

** Design Reg. U. S. Pat. Off.* *† Trade Mark Registered*



Model 6520
AIR
Control Valve
for pressures to 150 p.s.i.

Model 7025
HYDRAULIC
Control Valve
for pressures to 1500 p.s.i.

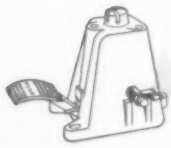


LATCHING CONTROL (Indefinite Dwell)

With latch lever *turned forward,* valve piston is shifted and *latched* when pedal is pressed, starting the cylinder outstroke. Operator can then release pressure of his foot—line pressure continues to be directed to desired end of cylinder, providing *indefinite dwell* at end of movement. When pedal is pressed *a second time,* latch releases and valve piston returns by spring load to normal position, reversing cylinder movement and providing indefinite dwell until cycle is re-started.

2 DISTINCT TYPES of CONTROL

INSTANT RELEASE (Spring Return)



With latch lever *turned back,* latching mechanism is thrown into neutral. Valve piston is shifted when pedal is depressed, and returns to normal position by spring load *as soon as foot pressure is released.* Thus pressing the pedal initiates the cylinder outstroke—releasing it will reverse cylinder movement.

FREE CATALOGS—AIR VALVE Catalog 90; HYDRAULIC VALVE Catalog 85. Write for your copies now!

Logan

SAVES
★ TIME
★ EFFORT
★ MOTION

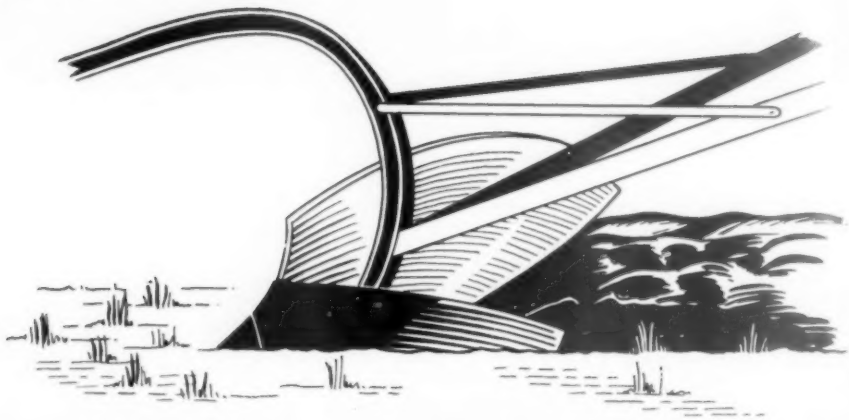
Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC.

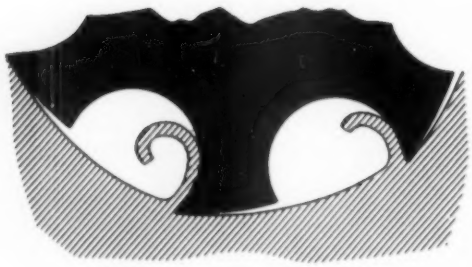
931 CENTER AVE.
LOGANSPORT
INDIANA

CHUCKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

A tap is like a plow...



. . . IT'S ALMOST IMPOSSIBLE TO LUBRICATE



THAT'S WHY

DETROIT

TAPS ARE MADE OF M-11 CHROME-COBALT H.S.S.

•

The Home of
"M-11"
CHROME-COBALT H.S.S. TAPS, THREAD MILLING CUTTERS & THREAD GAGES

The cutting edges and faces at the tip of the thread on a tap are "buried" in the metal on three sides. It's almost impossible to get lubricant to those points. Furthermore, cutting is continuous.

That makes thread cutting one of the toughest jobs there is in metal cutting, and is a major reason why Detroit taps are made of that toughest of tap steels—M-11 chrome-cobalt H. S. S.

The cobalt gives Detroit taps greater uniformity and higher red hardness.

Chromium gives Detroit taps greater toughness, for less breakage; deeper hardness penetration, corrosion resistance and GREATER RESISTANCE TO ABRASION.

And back of every M-11 tap, thread milling cutter and thread gage is a service record which can make the proud claim:

WE'VE NEVER "SHUT DOWN" A LINE YET!!

DETROIT

TAP & TOOL CO.

8432 BUTLER STREET • DETROIT 11, U. S. A.

3 IMPORTANT ADDITIONS to the Brown & Sharpe Line

THESE INGENIOUS new devices permit faster, simpler measuring of unusual-shaped parts—or in inaccessible places—with complete confidence in the accuracy of results. Their quality of craftsmanship and materials is typical of Brown & Sharpe in every respect.

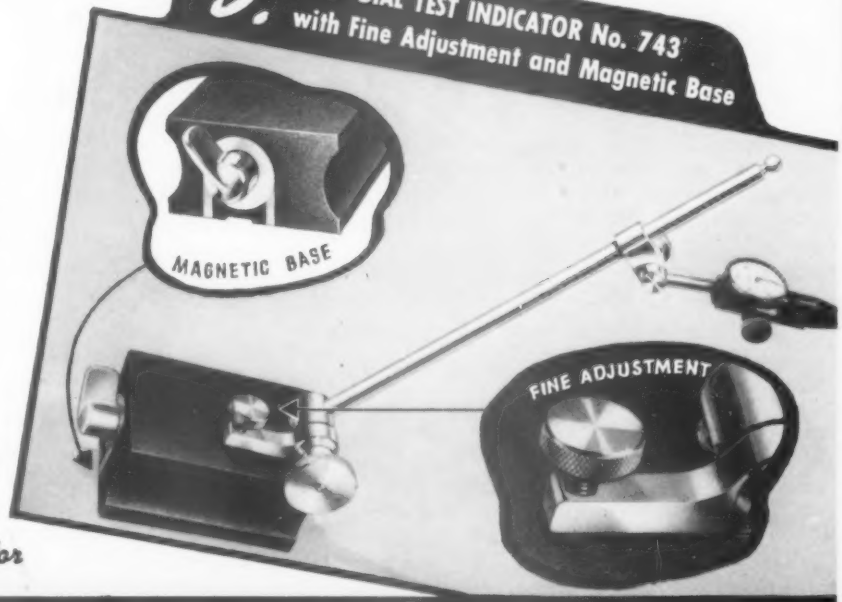
1. BALL ATTACHMENT No. 226 for Micrometer Calipers

1 This dual-utility attachment snaps on either anvil or spindle end of a micrometer caliper to facilitate measurement of curved sections. Hardened steel ball bears firmly against measuring surface. For all Brown & Sharpe micrometer calipers with conventional anvils and spindles except ½" and heavy types. Handy. Useful. Inexpensive.

2. CENTER AND SMALL HOLE ATTACHMENT SET No. 573 for Vernier Calipers

2 Center points of this attachment quickly convert a 6" or 150 mm vernier caliper into a direct reading divider that establishes center distances with precision. For locating holes to be drilled, establishing locating points in layout jobs, accurately measuring distance between two points or between a point and some locating part. Complete set includes two each; clamps, center points, small hole points.

3. DIAL TEST INDICATOR No. 743 with Fine Adjustment and Magnetic Base



3 The permanent magnet base of this device holds indicator firmly to any iron or steel surface . . . in upright, horizontal, or even upside-down position. Fine adjusting nut is used to bring indicator point to exact setting desired. Indicator's light weight reduces tendency to move. Magnet action produced by swing of lever. For sale only in the United States of America and its Territories.

Check all advantages of these new, fine tools. Write Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE TOOLS B·S

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Lo-swing IMP

TURNS AND GROOVES DISTRIBUTOR ROTORS WITH SPEED AND ACCURACY

Problem: To turn contact ring, distributor points and locking ring groove on Distributor Rotors. All machined surfaces must be concentric with the taper bore and have a fine, smooth finish.

Solution: The Lo-swing IMP Automatic Lathe was selected for this job because its design and construction provide the necessary speed, productive capacity and close accuracy demanded.

The Distributor Rotor is mounted on a special arbor which is accurately fitted to the headstock spindle bore, and prevented from working loose by a suitable locking bolt. The small end of the arbor is supported by a revolving tailstock center carrying a hardened and ground bushing which maintains a constant pressure on the end of the work piece, preventing any end play.

The contact ring and the distributor points are turned with three cemented carbide tools mounted on the front slide, while the ring groove is formed with a similar type tool mounted on the rear slide. The turning tools are properly spaced so that the intermittent cutting on the distributor points will not mark the contact ring. At the completion of the machine cycle, the operator throws an air valve, relieving the tailstock center and also actuating the work stripper arm located just over the headstock spindle.

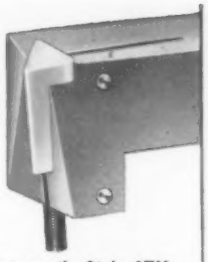
The machine cycle is extremely fast and the operator's work is reduced to the strict minimum of loading the parts on the arbor and pushing the starting lever.

Consult our Engineering Department for full information regarding time and other saving equipment.

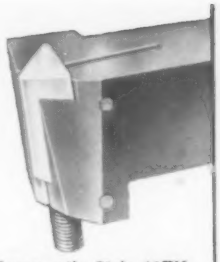
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

Kennamatic Style 3RK

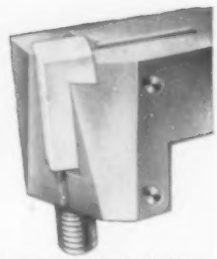


Kennamatic Style 3TK

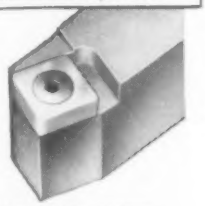


Kennamatic Style 11TK

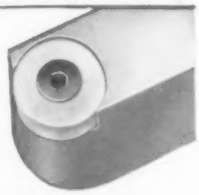
Kennamatic Style 9TK



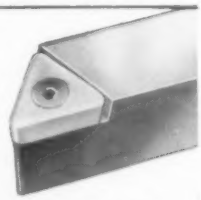
Kennamatic Style 11SK



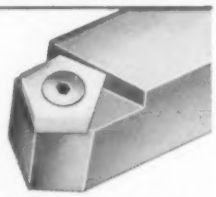
Kendex Style 11SKD



Kendex Style 3RKD



Kendex Style 3TKD



Kendex Style 11PKD

Here They Are...

KENNAMETAL Developments in Mechanically-Held Tooling

for Better Production at Less Cost

Kennametal mechanically-held tools are outstanding in their performance, and in the savings they effect, because:

THEY ELIMINATE THERMAL STRAINS

The inherent strength of Kennametal is more fully utilized. Harder grades can be used on heavy jobs at coarser feeds.

THEY SIMPLIFY TOOL SETTING

Tips can be repositioned, or replaced, without disturbing the tool holder.

THEY REDUCE GRINDING COSTS

Procedure is simpler and less frequently required. No steel needs to be ground—only the carbide. Indexing feature of Kennamatic and Kendex tools provides multiple cutting edges between regrinds.

THEY LOWER INVENTORY

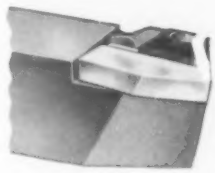
Fewer tools are required to float a specific job, and only tips or inserts need to be stocked.

THEY INCREASE MACHINE PRODUCTIVITY

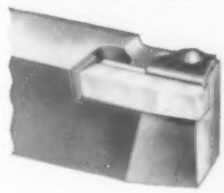
Down time is minimized because fewer tool changes and adjustments are required.

Our field representatives are fully equipped to help you apply this advanced tooling technique for better production at less cost. Ask them to demonstrate.

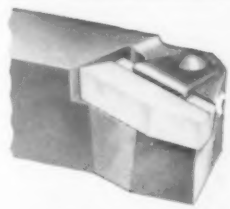
The tools illustrated are made in both hands, in various sizes, with Kennametal tips suitable for machining steel, cast iron, and non-ferrous alloys.



Clamped-on Style 12H

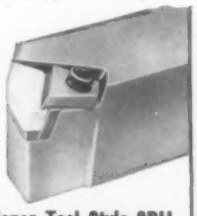


Clamped-on Style 40H



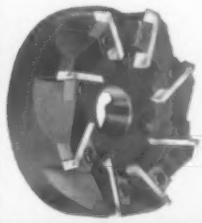
Clamped-on Style 2H

Planer Tool Style 11 PH



Planer Tool Style 9PH

Planer Tool Style 59PM



"Universal" Face Kennamill

"AF" Axial Face Kennamill

WINTER BROTHERS TAPS ARE DEPENDABL

COORDINATED RESEARCH

Dependability is built into Winter Taps by a carefully coordinated research program. This includes research into raw materials, heat treatment methods, and performance records in the laboratory and in the field. This interlocking research program keeps Winter Brothers abreast of the latest developments in the art of metal cutting. It assures you better performance and longer tool life when you specify Winter Taps.

Always at Your Service

YOUR LOCAL DISTRIBUTOR carries a complete stock of Winter Taps on his shelves — as close to your tapping problems as the telephone on your desk.

Winter Chip Driver Taps are designed for fast operation in tough alloys. They are part of Winter's complete line of carbon and high speed steel taps and dies.

Winter Brothers COMPANY

ROCHESTER, MICHIGAN, U.S.A. • Distributors in Principal Cities • A Division of the National Twist Drill and Tool Company • Branch Stores: Detroit, Chicago, San Francisco

WINTER

PERFORMANCE IS BUILT INTO NATIONAL METAL CUTTING TOOLS

FIELD ENGINEERING SERVICE

National Heavy Duty Milling Cutters are designed for heavy cuts where a substantial amount of stock must be removed. Other National metal cutting tools include twist drills, reamers, counterbores, end mills, and hobs.

Long and productive tool life depends as much on the way tools are used as on their quality and design. To help users get the most out of their metal cutting tools, National maintains a complete field engineering service. National engineers have the wide experience of the entire National organization to call on. You are invited to call on your National field engineer the next time you run into a troublesome metal cutting problem.

Call Your Distributor

LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL Cutting Tools. Call them for cutting tools or any other staple industrial product.

NATIONAL TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICHIGAN, U. S. A. Tap and Die Division—Winter Bros. Co.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

NATIONAL TWIST DRILL & TOOL ROCHESTER, MICH. U.S.A.

Only THE NAME HAS BEEN CHANGED . . .

The SAME *Skilled Craftsmen*
The SAME *Quality of Product*

● As a final step in the modernization of our new plant, we decided to go all the way and modernize our company name as well. Henceforth, METAL CUTTING TOOLS AND MANUFACTURING COMPANY will be known as the FULLER TOOL COMPANY. It's a logical changeover... for every operation and every skilled operator in our plant is under the direct supervision of one of the Fuller brothers. Six brothers in all . . . Walter . . . Bill . . . Ernest Edward . . . Jim . . . George . . . each cooperating to the utmost to produce the finest product possible. Our new slogan, "it's better, if it's made by Fuller" is no idle boast. Whatever tool we build for you, you can be sure it will be as near perfection as ultra modern machines and skilled craftsmen can make it. It's a matter of family pride.

Now . . .

FULLER TOOL *company*

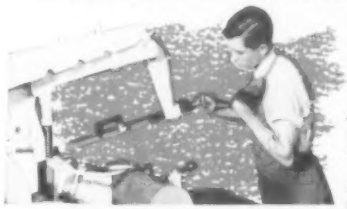
SPECIAL TOOLS • PRECISION MACHINING
3950 WEST ELEVEN MILE ROAD
R. 2 · BOX 161 · BERKLEY · MICH.

LINCOLN • 2-5600 • TRADE GUILD MARK

NEW SIMOMETER

gives you accurate TESTED TENSION in less than 1 minute per blade

Here's how SIMONDS Quick and Easy Tensioning Method gives you LONGER BLADE LIFE!



Avoid Undertension which causes crooked cutting, spoiled work, lost time.

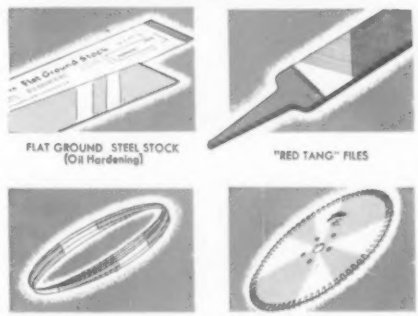
Avoid Overtension which causes blade-vibration, rapid dulling of teeth, frequent blade-breakage.

Slip the *Simometer* Directly over Blade, tighten two thumbscrews . . . now put tension on blade until **Simometer** needle moves into green zone . . . and you *can see at a glance* you have the right tension on the blade.

Then You're Set to get Faster, Straighter Cuts... and more cuts per blade . . . *the full measure* of performance which **SIMONDS** "Red End" Power Blades are made to give you. Ask your distributor.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 511 S. W. First Avenue, Portland 4, Ore.; 51 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SIMONDS ALSO MAKES:



FLAT GROUND STEEL STOCK (Oil Hardening)

"RED TANG" FILES

METAL-CUTTING BAND SAWS (Regular Hard Edge, Skip-Tooth, Spring Temper)

CIRCULAR METAL-CUTTING SAWS (Inserted-Tooth, Segmental, Solid-Tooth)

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS Special Electric Furnace Steels

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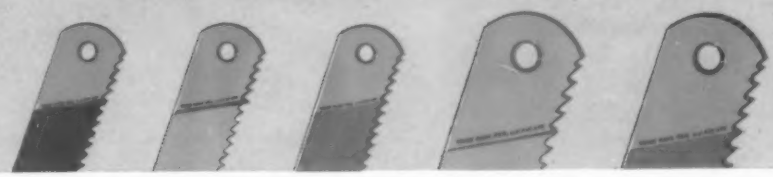
SIMONDS "Red End" HACKSAW BLADES



WHEN YOU USE SIMONDS YOU STAY IN THE HIGHLANDS . . . OF CONSISTENT CUTTING EFFICIENCY

Gutenberg examining the first paper to be printed with movable type — about the middle of the 15th century.

KOOLPORE® was unheard of then!

Yes, there was no word about KOOLPORE grinding wheels on the first paper to be printed with movable type, but today there's plenty of good words about KOOLPORE — both in print and throughout industry.

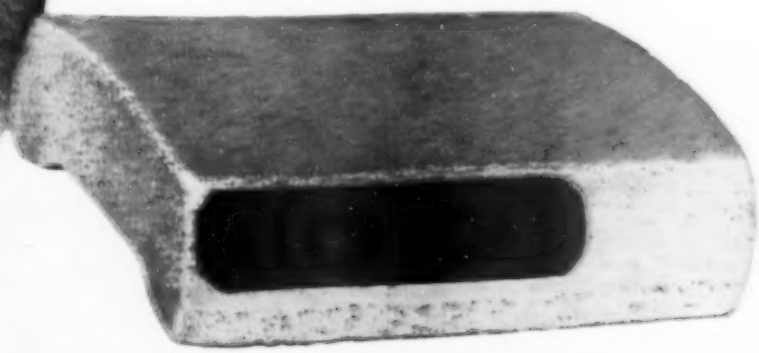
These BAY STATE abrasive products, with their large pore spaces, are giving an outstanding performance on countless SURFACING and TOOL and CUTTER JOBS that require extra coolness of cut, and fast, heavy removal of metal.

Here's 5 features that make KOOLPORE grinding wheels superior:

1 — Faster Cutting
2 — Cooler Cutting
3 — No Chip Jam
4 — Greater Clearance
5 — Increased Production

Write for Koolpore folder which includes specifications.

Branch Offices and Warehouses — Chicago — Detroit
Distributors — All Principal Cities



BAY STATE®

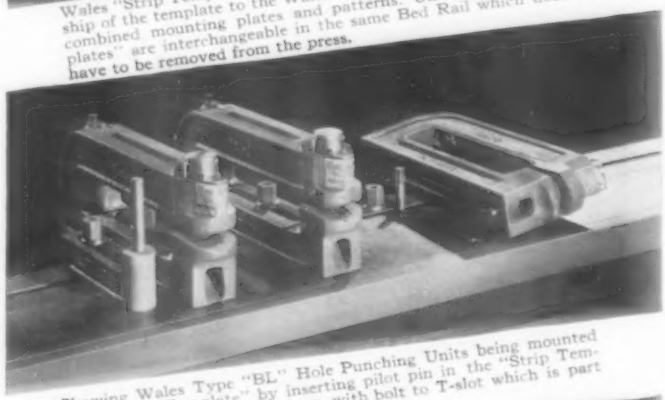
Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO., WESTBORO, MASSACHUSETTS, U. S. A.

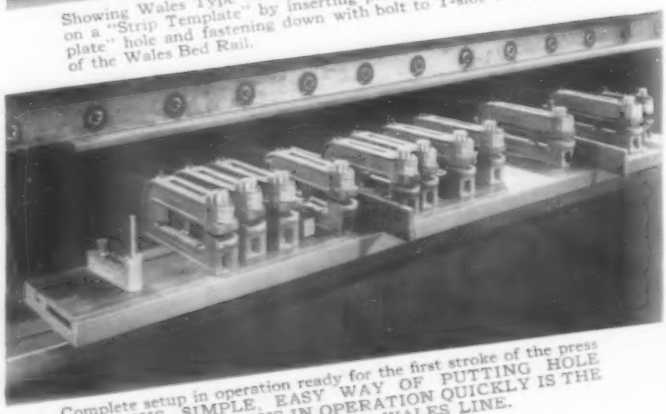
Nothing can be

WHAT COULD BE SIMPLER FOR HOLE PUNCHING THAN THE WALES *patented* AND EXCLUSIVE TEMPLATE MOUNTING METHOD*

Wales "Strip Template" with mounting holes showing the relationship of the template to the Wales Bed Rail. "Strip Templates" are combined mounting plates and patterns. Unlimited "Strip Templates" are interchangeable in the same Bed Rail which does not have to be removed from the press.



Showing Wales Type "BL" Hole Punching Units being mounted on a "Strip Template" by inserting pilot pin in the "Strip Template" hole and fastening down with bolt to T-slot which is part of the Wales Bed Rail.



Complete setup in operation ready for the first stroke of the press ram. THIS SIMPLE, EASY WAY OF PUTTING HOLE PUNCHING PATTERNS IN OPERATION QUICKLY IS THE NEWEST INNOVATION TO THE WALES LINE.

one important application is in combination with . . . WALES Type "BL" HOLE PUNCHING UNITS

● *Only Wales Hole Punching and Notching Equipment has this simple setup method* that provides these NEW money-saving and time-saving advantages.

Wales Patented Mounting Method requires *only one template*. This template serves the dual purpose of being a combined mounting plate and pattern. Faster setups, almost complete elimination of press "down time", and easier storing of templates and mounting plates are *economies that cannot be overlooked by today's cost-conscious Production Executives.*

Store the templates and you store the die without Wales Hole Punching and Notching Equipment.

BUT this patented template setup method is only one part of the total savings. The other part, equally important, is the efficiency and economy produced by the Wales Hole Punching and Notching Equipment.

For example:—Before the availability of Wales Equipment, it was necessary to design and custom-build a completely new "fixed" die for each pattern. This required special punches and punch plates, special stripper plates, and special die buttons and die plates for each die. NOW—a group of these self-contained, permanently aligned Wales Units may be set up in unlimited patterns and put into operation the same day a pattern is released for production.

Tooling with Wales Equipment is reduced to a simple, quick assembly operation. Also the same group of Wales Hole Punching and Notching Equipment may be used and reused in an unlimited number of setups.

THE SIMPLICITY AND ECONOMIES OF WALES EQUIPMENT IS TOO BIG A STORY TO TELL ON THIS PAGE *SO WRITE FOR FULLY-ILLUSTRATED, FUNCTIONALLY-COLORED CATALOG TODAY.*

* *Note:* The Wales-Strippit Corporation has not granted permission to anyone to use this patented mounting method *except with Wales Hole Punching and Notching Equipment.*

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, President

393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

Gutenberg examining the first paper to be printed with movable type — about the middle of the 15th century.

KOOLPORE® was unheard of then!

Yes, there was no word about KOOLPORE grinding wheels on the first paper to be printed with movable type, but today there's plenty of good words about KOOLPORE — both in print and throughout industry.

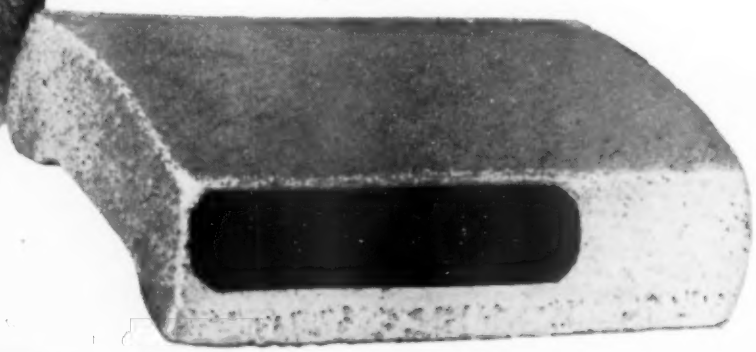
These BAY STATE abrasive products, with their large pore spaces, are giving an outstanding performance on countless SURFACING and TOOL and CUTTER JOBS that require extra coolness of cut, and fast, heavy removal of metal.

Here's 5 features that make KOOLPORE grinding wheels superior:

1 — Faster Cutting
2 — Cooler Cutting
3 — No Chip Jam
4 — Greater Clearance
5 — Increased Production

Write for Koolpore folder which includes specifications.

Branch Offices and Warehouses — Chicago — Detroit
Distributors — All Principal Cities



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Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO., WESTBORO, MASSACHUSETTS, U. S. A.

Nothing can be WHAT COULD BE SIMPLER FOR HOLE PUNCHING THAN THE WALES patented AND EXCLUSIVE TEMPLATE MOUNTING METHOD*

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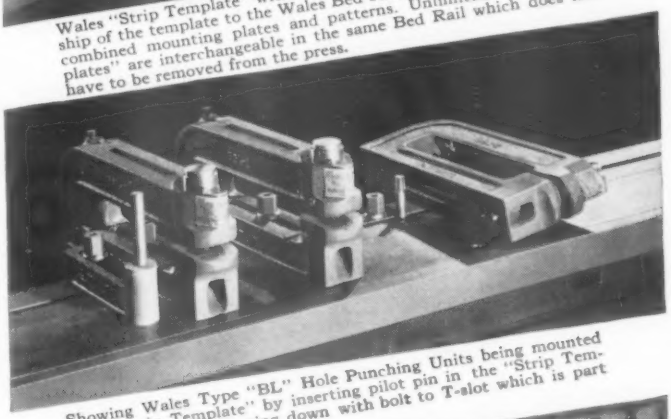

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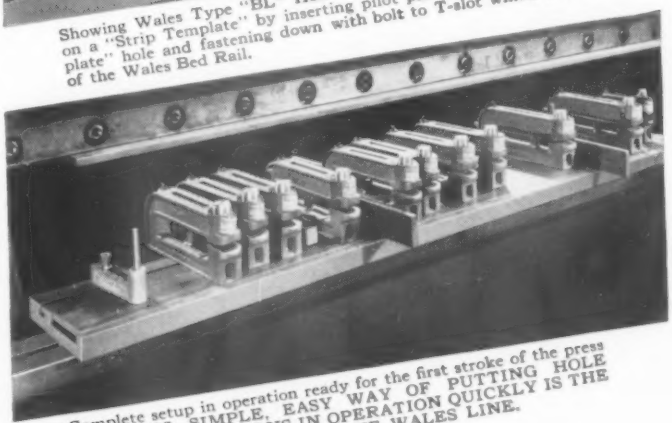

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Specialists in Punching and Notching Equipment

SUPER brings the carbide drill picture up to date!

Increasing use of carbide in production drilling with its proven economies has, for some time, demanded a revamping of drill standards. Super has tackled the problem.

Bring your records up to date! Write today for Super's new bulletin listing revised size ranges and prices on carbide tipped and solid carbide drills.

Standard Solid Carbide Twist Drills
1/16" to 1/4"
Wire Sizes .1520 to .0595

STD

Standard Straight and Taper Shank
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1/8" to 1"

Now

All Super Twist Drills are shipped with complete instructions on recommended applications, speeds and feeds.

STANDARD AND SPECIAL **SUPER** *Carbide Tools*

SUPER TOOL COMPANY

21650 Hoover Rd., Detroit 13, Michigan • 5210 San Fernando Rd., Glendale 3, California

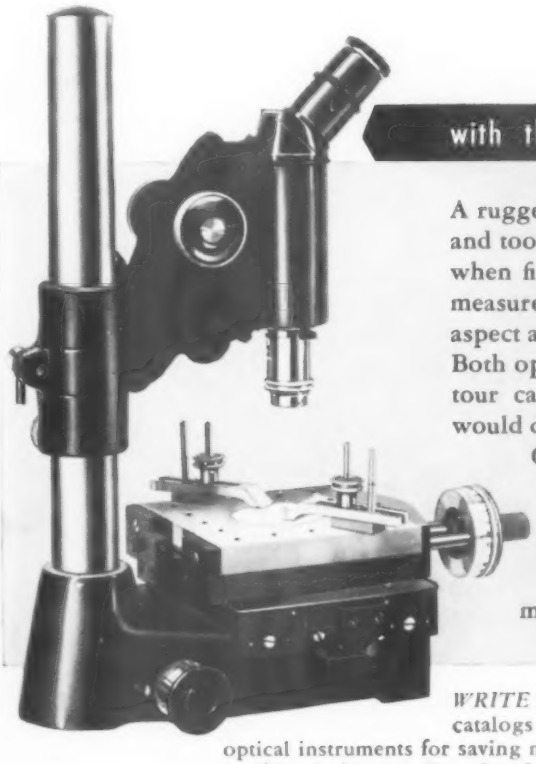
Save Man-Hours . . . *Save* Money . . .

In Producing and Inspecting Tools and Finished Parts

with the Bausch & Lomb CONTOUR MEASURING PROJECTOR

No other projector gives you this accuracy. With the protractor screen, all angular measurements can be read to ± 1 minute of arc (1′). Direct linear measurements, reading to ± .0001″, can be made by means of the cross slide stage. The projected, magnified image of the object on the ground glass screen is sharp, and well defined.

Dimensions, angles, and profiles of production-run parts can be compared directly with a traced outline of the projected image of the master part, or with a large scale drawing superimposed on the screen. Inaccuracies are located quickly and simply. Catalog D-27.



with the Bausch & Lomb TOOLMAKERS' MICROSCOPE

A rugged shop instrument especially designed for the machinist and toolmaker. It is used for precision linear measurements and, when fitted with the protractor eyepiece, for precision angular measurements. Objects and movements are seen in their natural aspect and direction . . . not reversed as in ordinary microscopes. Both opaque and transparent objects of regular or irregular contour can be measured. It is ideal for measuring parts which would distort under pressure of the most delicate instruments.

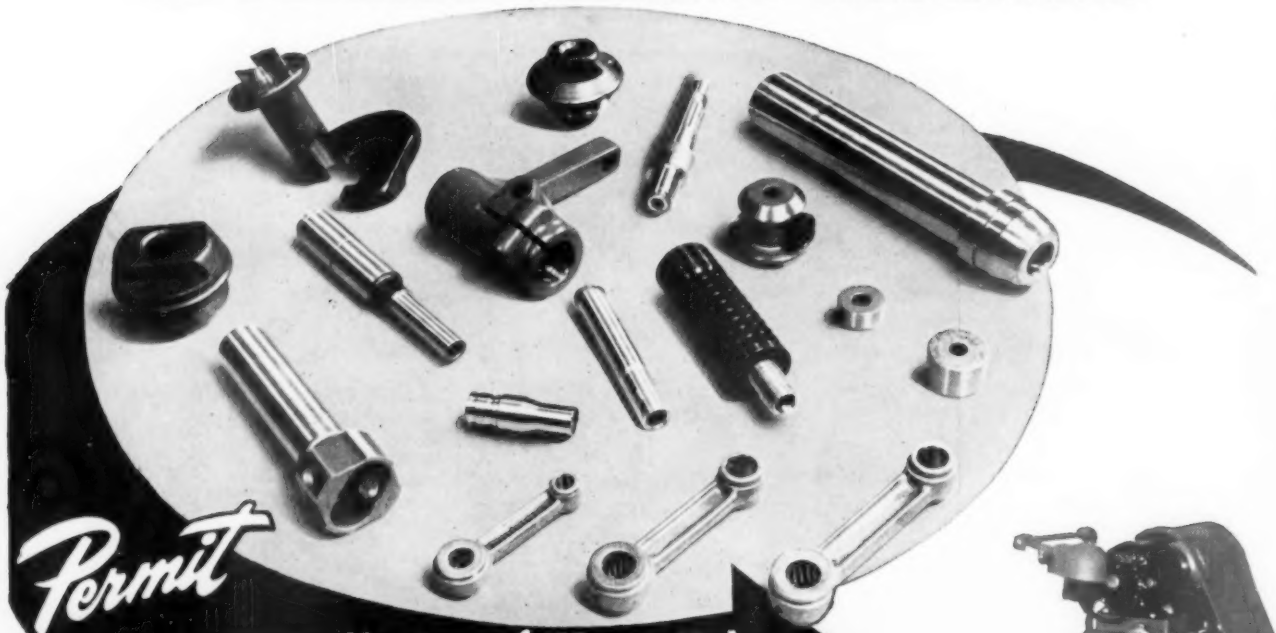
Operation is exceptionally simple and fast. Linear measurements to ± .0001″ can be made by means of the cross slide stage, controlled by two micrometer screws, and angular measurements to ± 1 minute of arc (1′). Various other attachments are available to meet special measurement problems. Catalog D-22.

WRITE FOR COMPLETE INFORMATION . . . The above listed catalogs illustrate and describe these and other Bausch & Lomb optical instruments for saving man-hours, and maintaining accuracy standards in metal working industries. Bausch & Lomb Optical Co., 763-S St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

At Black and Decker Mfg. Co. . . . .
MINIMUM SET-UP TIME and Versatility of SUNNEN HONING MACHINES



Permit

Accurate Honing of Many Holes
Economical Handling of Short Runs
Salvage of Expensive Parts

Sunnen Precision Honing Machines are used to accurately hone 25 different holes in 18 different parts. Production jobs range from .1562" to 1.1875" diameter. Both blind and open holes are held to close tolerances for straightness and roundness.

Because set-up time is never more than 5 minutes, small production runs and salvage jobs are usually completed before other machines could be set up. Finishing costs are reduced, surface finish is improved and rejects are held to a minimum. Operators are trained in about 1/6 the time required for other methods.

If your parts require straight, round holes from .120" to 2.625" in diameter, it will pay you to investigate Sunnen Precision Honing.

Write for booklet X-MAN-5000 or, on request, a Sunnen engineer will be glad to show you how you can use Sunnen Honing in your plant.

SUNNEN
PRECISION HONING MACHINE

- Hones holes .120" to 2.625" in diameter
- Accuracy to .0001" guaranteed
- Hones steel, cast iron, aluminum, bronze, plastics, ceramics, glass
- Low in cost, economical to use

SUNNEN PRODUCTS COMPANY · 7942 Manchester Ave. · St. Louis 17, Mo.

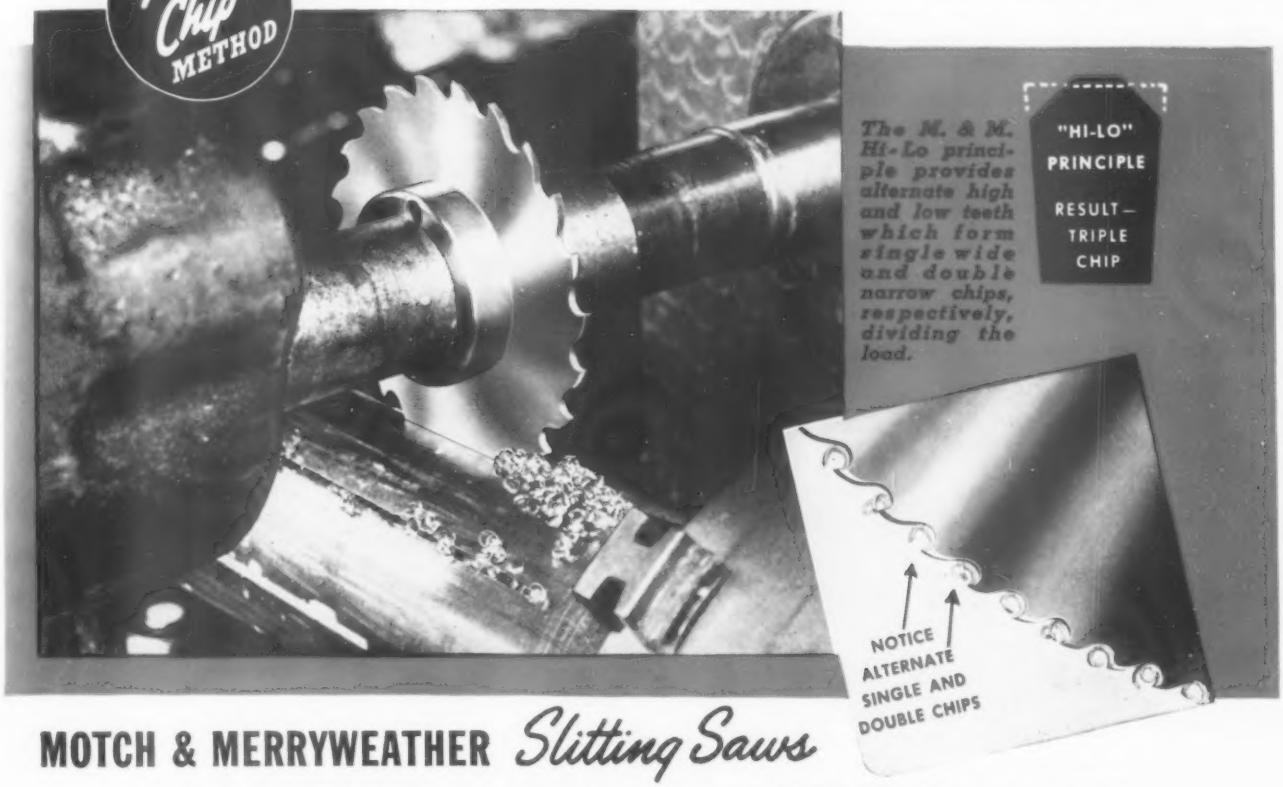
Canadian Factory: Chatham, Ontario

331

BREAK UP *Your Chip Loads..*

CASH IN ON FASTER FEEDS AND SPEEDS!

Triple-Chip METHOD



MOTCH & MERRYWEATHER *Slitting Saws*

GIVE GREATER SPEEDS AND LONGER TOOL LIFE

Motch & Merryweather's original dual drive equalizes stresses, gives plenty of driving power, and makes blade keyways unnecessary

M. & M. Slitting Saw Blades enable you to profit from record-breaking speeds and satisfying accuracy. They give you all the well known advantages of the Triple-Chip Method. The characteristic M. & M. curved, cam-generated tooth contour avoids clogging, since the curling chips are self-clearing. A generous gullet imparts great strength to the teeth. Result: faster cutting, longer blade service.

Exclusive dual drive design supplies positive driving power and protects the driving means; practically no blade breakage. Blades adaptable to arbors up to 1¼"; interchangeability conserves blade investment. Range of pitch in all diameters and thicknesses. Other big advantages, too.

Get well illustrated Bulletin "T-6"

Only M & M builds ALL 3: CIRCULAR SAW SAW BLADE BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.

PENTON BUILDING • CLEVELAND 13, OHIO

CUTTING TOOL DIVISION

AT YOUR COMMAND · AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

Increase the Scope of your machines!

Here's the quick, easy way to increase production capacity . . . put R and L Turning Tools to work on your turret lathes and screw machines. With the simple, single R and L Turning Tool illustrated at the left, you can set up combinations of two or more operations quickly. Speed up operations in your plant by using R and L Turning Tools to replace old-fashioned, single purpose tools and holders. Built in five sizes, they're constructed of heat-treated alloy steel and every essential part ground to provide accurate alignment.

Above: pointing work concentric with turned diameter using burnishing backrest to support work.

Write today for your copy of the idea-packed R and L booklet which gives full details of R and L Tools and shows many unusual, adaptable set-ups for your shop!

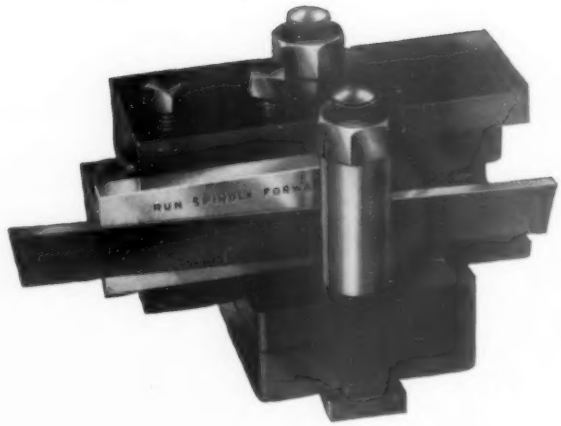
these are NEW!

R and L CUTTING OFF TOOL HOLDERS

Designed for use in the new R and L Tool Rest illustrated at right and built in a variety of sizes and two models for use on the front or rear cross-slide with the spindle running forward or backward.

R and L TOOL POST

Holds all types of tools on front or rear cross-slide. Write for complete details of this and other New R and L Tools—designed for greater production capacity.



R AND L TOOLS

1825 BRISTOL STREET
NICETOWN
PHILADELPHIA 40, PA.

NEW PROVISION FOR PRECISION ON MULTIPLE SPINDLE MACHINES

SCULLY-JONES

MICRO-NUTS*

You make "Precision" Adjustments—Now you can make really accurate adjustments on Multiple Spindle Machines to .001 in., by scribing a mark at any point on the Spindle (see illustration) and turning the easy-to-read, calibrated Scully-Jones Micro-Nut in the direction required.

You Save Set-Up Time—You simply give a quarter-turn to the set-screw, to lock Scully-Jones Micro-Nuts in place at any location on the thread of the Adapter. Note diagram showing that screw *does not touch* threads.

Keep Inventory Down—Your requirements will be filled immediately from our stock of the following popular sizes, in "Acme" thread: 3/4", 1" and 1-1/16". A complete stock of all sizes for Adapters with "Acme" and "V" threads will be available Sept. 1, 1948. Write for bulletin giving further details and prices.

*Patent applied for R-2847

For Both Types of Threaded Adapters—You can use these low-cost Micro-Nuts on your present Adapters with or without set-screw slots.

Make Same Range of Adjustments—You can make the same range of adjustments, between spindle and work, with Scully-Jones Micro-Nuts as you do with standard solid adapter nuts.

Nothing to Get Out of Order—You will like the simple, trouble-free one-piece design, with vapor blast finish. Scully-Jones Micro-Nuts are machined and hardened to our high quality specifications, to assure you the service demanded by modern, high-speed production.

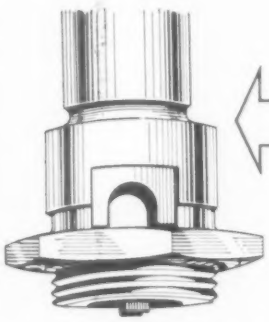
Scully-Jones AND COMPANY

1915 S. ROCKWELL ST.
CHICAGO 8, ILLINOIS

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

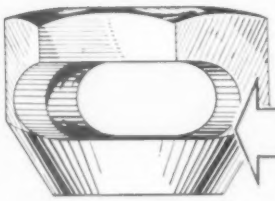
Facts about "ACORN" DIES

The "Acorn" Die has produced billions of threaded parts since its introduction in 1909. It has given superlative performance in thousands of plants where high production, high speed, accuracy and thread quality are all "musts". The reason for its popularity is its simplicity, ruggedness, and accuracy. Its design explains why the "Acorn" fills the bill.



HOLDERS fit any machine. Lock nut sets die at any desired adjustment.

"ACORN" DIE with threaded prongs.



ADJUSTING CAP presses equally on all prongs for easy, accurate adjustment.

TO USE: Just screw up the cap to desired adjustment and turn up the lock nut. A threaded plug comes with each die. This test plug has been threaded by the die with which it is packed and insures the accuracy of your set-up. *"Acorn" Dies are stocked by your "Greenfield" Distributor.*

For the complete story of the "ACORN" DIE write for booklet!

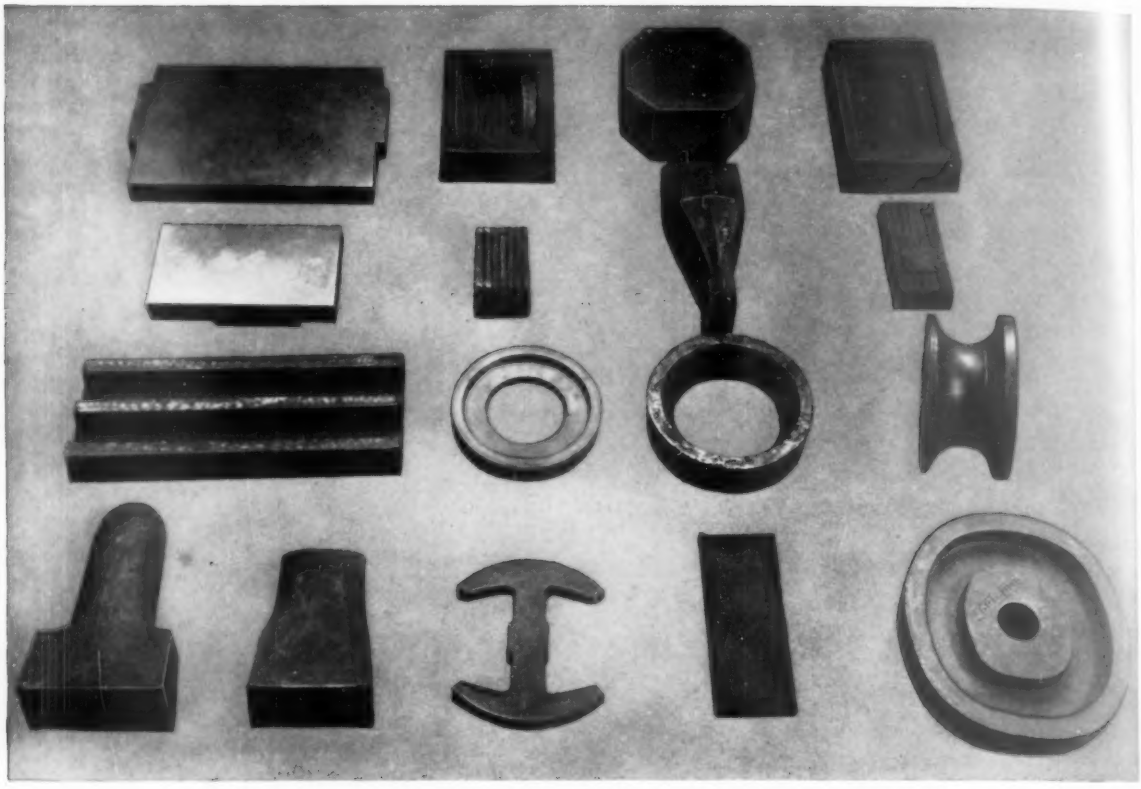
GTD GREENFIELD

World's Leading

THREADING TOOLS

When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers—PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

GREENFIELD TAP and DIE CORPORATION GREENFIELD, MASSACHUSETTS



Start with Your Job *Half Finished!*

Write for New Booklet:

CAST-TO-SHAPE

TOOL STEEL

Gives you full details on FCC Air Hardening, Oil Hardening and other Cast-To-Shape Tool Steel Specialties capable of saving you time and money.

Get Your Copy—

Write for it Today

ADDRESS DEPT. TE-65.

WHEN it's dies you're making—small or large—or various other forming tools or gages or certain fast-wearing parts of machines, FCC Tool Steel *Cast-To-Shape* can really save you shop time and money.

Very intricate shapes can now be cast in one piece within an eighth-inch of finished size. This means that you pay for less steel to begin with, and reduce machining time substantially.

Air Hardening, Oil Hardening and special Hot Work Tool Steels of various grades—each a thoroughly dependable performer in its class—are promptly available in this modern, economical form, ready to reduce your costs.

Any Allegheny Ludlum branch office can give you full particulars, or write our Detroit headquarters for data.

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

Forging and Casting Division

DETROIT 20, MICHIGAN

WAD 1695

•7200 stainless steel stampings per hour—

•tolerances held within 0.002" —

...using

DANLY

STANDARD PRECISION

DIE SET

Sustained operating precision of die set reduces die wear...produces 200,000 stampings per grind

Inherent accuracy in Danly Die Sets permits taking full advantage of the die maker's precision under actual press operating conditions. As a result, close tolerances may be held and tool life is substantially increased.

In the stamping operation shown, stainless steel parts for electrical instruments are pierced, formed and blanked in an intricate progressive die. Tolerances are extremely close, and finished parts must pass rigid gage inspection.

Stampings are produced at a rate of 120 per minute. At this high speed, a tolerance of 0.002 in. is held on inside and outside diameters and the distance between the bent arms. Danly Die Set accuracy is a major factor in maintaining punch-and-die relation, resulting in production of 200,000 parts between grinds.

DANLY ENGINEERING SERVICE—Use Danly Die Sets to insure the same close precision, high production and long die life on all of your press work. Consult our Engineering Dept. for helpful recommendations on die sets—large or small, standard or special—for *any type* of press operation. (No obligation.)

DANLY NATION-WIDE ★ASSEMBLY SERVICE

Danly offices in 10 key cities give immediate attention to your orders. Assembly plants (marked with stars) stock interchangeable parts for quick delivery of any standard die set to your specifications.

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★ **Dayton 2,** 990 E. Monument Ave.
★ **Detroit 16,** 1549 Temple Ave.
★ **Grand Rapids,** 113 Michigan Ave., N. W.
★ **Long Island City 1,** 47-28 37th St.
★ **Los Angeles 54,** Ducommon Metals & Supply Co., 4890 S. Alameda
● **Milwaukee 2,** 111 E. Wisconsin Ave.
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get this *free* bulletin

Write for this informative bulletin, indicating the nature of your requirements.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

PRECISION DIE SETS...STANDARD AND SPECIAL

MECHANICAL PRESSES AND PRESS EQUIPMENT

Above: This trimmer die of A-H5 tool steel has sharp edges for r[illegible]ving the ragged edge from center supports of 11-gauge sheet steel. Fin[illegible]d at the rate of 100 per hour, these members strengthen the roofs of the modern subway cars built at the Berwick plant.

Left: Easy machining is good news for the tool and die makers. This view shows a shaper making a finishing cut on a flat of A-H5 tool steel.

Bethlehem Tool Steel at a.c.f.

A-H5 (5 pct. chrome air-hardening)

New York's subway riders will enjoy the greater comfort provided by the 750 new cars being delivered by a.c.f. for the IRT, IND and BMT systems of the New York Board of Transportation.

In building a variety of railroad and subway cars, American Car and Foundry put extra emphasis on quality in their specifications for materials and equipment. That's why we're pleased to know that production men at a.c.f.'s Berwick, Pa., plant report fine performance from Bethlehem A-H5 (5 pct chrome air-hardening) tool steel.

A-H5 is used for dies that trim, blank, notch and form many different component car parts. Materials include aluminum, carbon steel, and low-alloy high-tensile steel. Many of the dies are intricate and must hold close tolerances over a long service life.

A-H5 gives good performance because it combines these features:

- Good machinability
- Safe, uniform hardening
- High resistance to deformation
- High wear-resistance
- Sharp, durable cutting edges

Here's a grade of steel that's hard to beat when safer hardening and high wear-resistance are of special importance. It's stocked in our mill depot—and your nearest Bethlehem tool steel distributor can give you prompt delivery too.

	C	Mn	Cr	Mo	V
Typical Analysis:	1.00	0.60	5.25	1.10	0.25

Hardness: Annealed, 212 Brinell; hardened, 60 to 62 Rockwell C.

BETHLEHEM STEEL COMPANY
Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

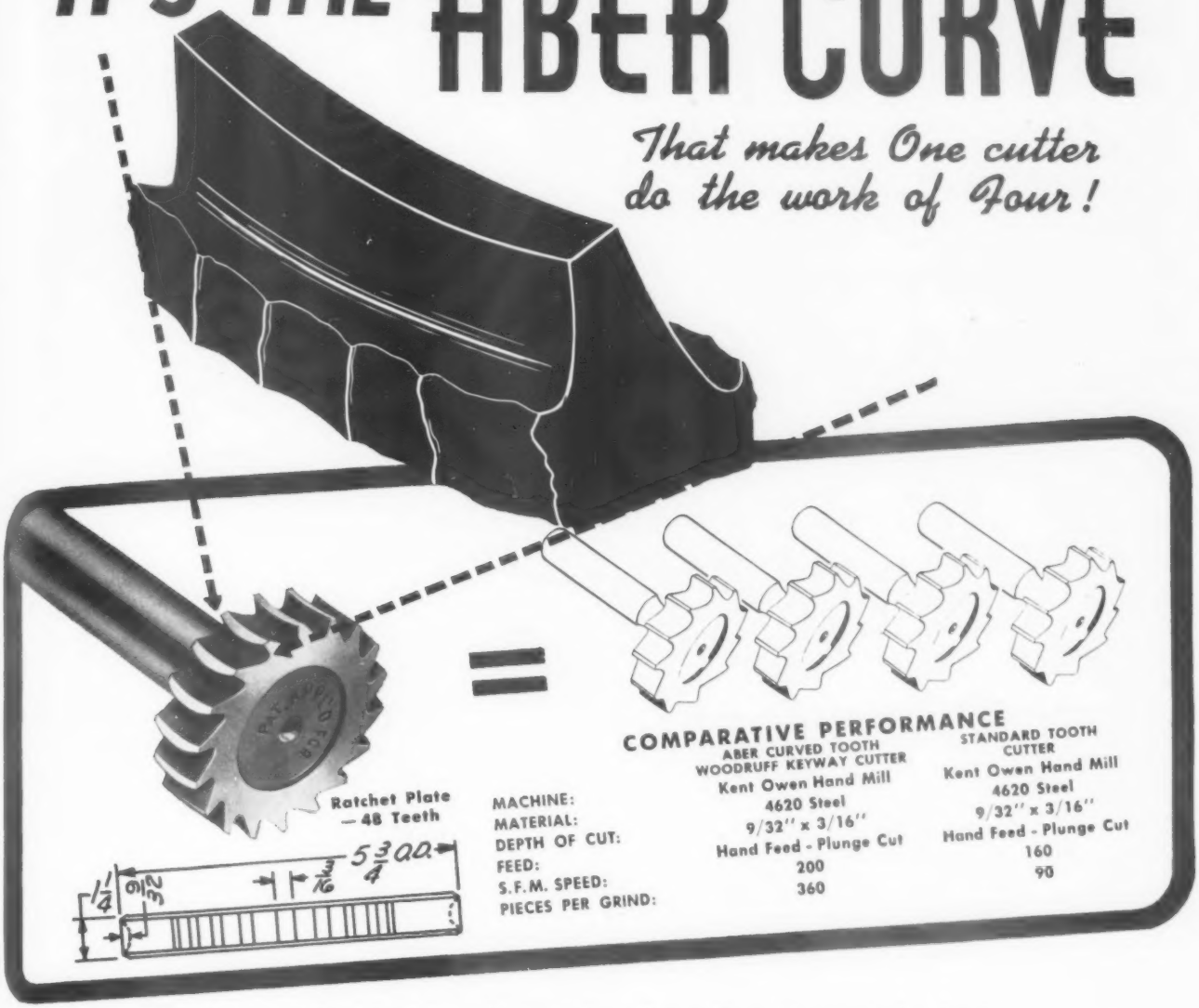
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

A-H5 . . . one of Bethlehem's Fine Tool Steels

IT'S THE ABER CURVE

That makes One cutter do the work of Four!



COMPARATIVE PERFORMANCE

	ABER CURVED TOOTH WOODRUFF KEYWAY CUTTER	STANDARD TOOTH CUTTER
MACHINE:	Kent Owen Hand Mill	Kent Owen Hand Mill
MATERIAL:	4620 Steel	4620 Steel
DEPTH OF CUT:	9/32" x 3/16"	9/32" x 3/16"
FEED:	Hand Feed - Plunge Cut	Hand Feed - Plunge Cut
S.F.M. SPEED:	200	160
PIECES PER GRIND:	360	90

Yes, in an actual test in a large pipe threading company's shop, ONE Aber Curved Tooth Woodruff Keyway cutter performed the work ordinarily requiring FOUR cutters of standard tooth design. This 400% increase in cutter performance is by no means unusual, for Aber's exclusive curved tooth design permits a smoother finish, absence of chatter, greatly increased cutter life, and cuts more freely with far less hand pressure from the operator. In addition, it proved to be a tremendous saver of "down" time, and reduced costs in the cutter grind room.

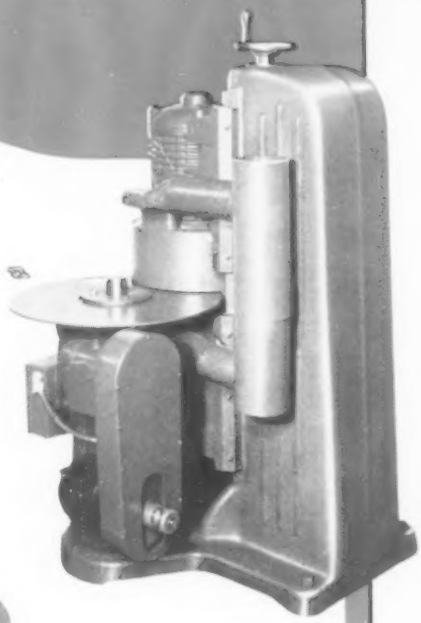
Write today for your free copy of the new Aber Catalog, containing a wealth of information on the latest developments in the milling cutter field. A sound, practical guide to cutter buying.

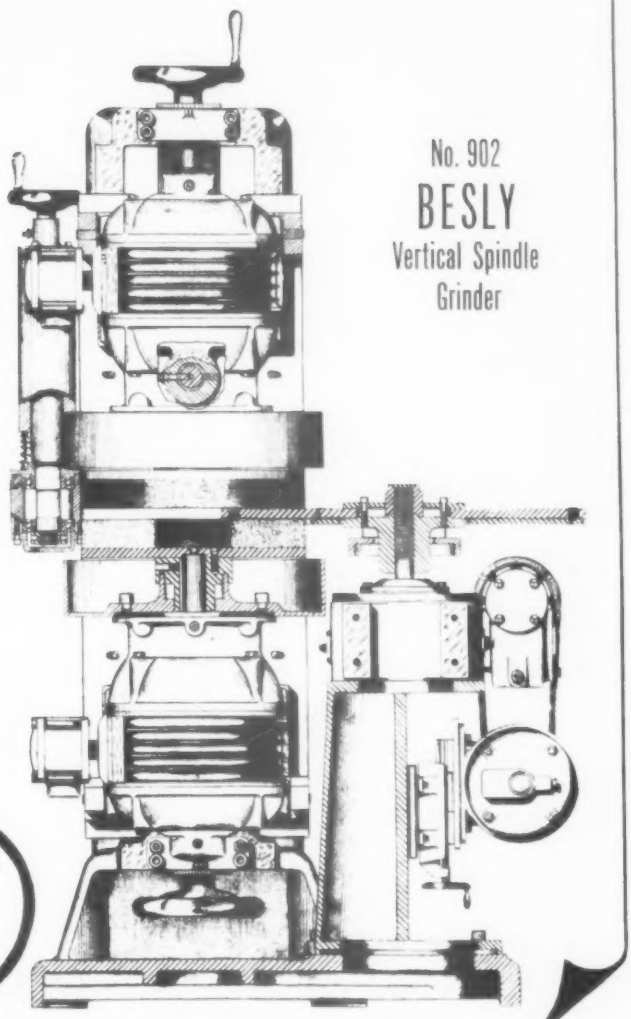
ABER

ENGINEERING WORKS INC.
WATERFORD, WISCONSIN

CERAMIC *and* PLASTIC PARTS, *TOO*

ARE GROUND WITH SPEED AND ECONOMY ON BESLY'S "902"





No. 902
BESLY
Vertical Spindle
Grinder

BESLY GRINDERS

WRITE FOR SPECIAL BULLETIN!

Ask for your copy today. An adaptation of the "902" may be the answer to your production needs. To check possibilities, talk to a Besly engineer.

This *high-output* Besly Vertical Spindle Grinder—*originally designed for precision grinding of small coil springs*—handles a large variety of small ceramic and plastic parts. It provides a better finish—*plus faster production and minimum grinding costs.* The unusual versatility of this machine is demonstrated by its use also for finishing springs, washers and many other small parts. Simple loading and gravity unloading speeds the production rate.

You'll Do BETTER with **BESLY**

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No matter what your Work Holding Problem . . .
consult
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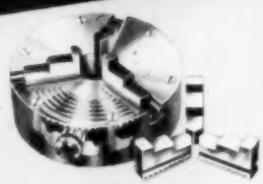
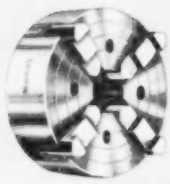
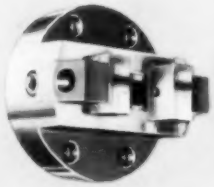


3 JAW
SELF-CENTERING

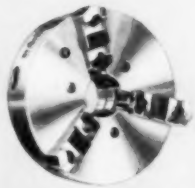


4 JAW
INDEPENDENT

Medium Duty



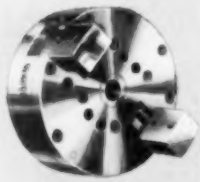
2 JAW
SELF-CENTERING



3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Heavy Duty



2 JAW
SELF-CENTERING

3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Extra Heavy Duty

3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Cushman Chucks are now being made in a wide range of types, sizes and jaw specifications for mounting on American Standard Type A-1, Cam-lock Type D-1 and Long Taper Key Drive Spindle noses, as well as for use on threaded spindles, using adapter plates. The right chuck with the right jaw equipment can help you reduce machining costs. Consult us.

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Chucking Engineers Since 1862

Pacific Coast Plant Betters Production of Hot Water Tanks with FARQUHAR HYDRAULIC PRESS

NO production time has been lost for maintenance purposes since the day this 500-ton Farquhar metal-forming press was installed at the Seidelhuber Iron & Bronze Works, Seattle, Washington.

The Farquhar Press is used for forming heads for hot water storage tanks. Better production is obtained because there has been no machine "down-time" with the Farquhar Press on the job. Smoother operation and improved quality are obtained because Farquhar's hydraulic cushion eliminates wrinkling and tearing.

The Seidelhuber plant is only one of hundreds of users throughout industry who depend on Farquhar Hydraulic Presses for better production. In the shop or on the line, you get the benefits that Farquhar builds into every press: (1) Rapid advance and return of ram *for faster work*. (2) Extra length guides on moving platen *for greater accuracy*. (3) Finger-tip controls *for easy, smooth operation*. (4) Positive control of speed and pressure on the die *for longer die life*. Farquhar builds hydraulic production presses in all sizes and capacities for all types of industry.

Farquhar engineers are ready and willing to help solve whatever production problem you may have, with a hydraulic press that will do your job faster, better and cheaper. Why don't you give them a call?

Farquhar Hydraulic Press, *forming heads for hot water tanks. Nine gauge steel blank material (30" x 30") is used; head is 26" diameter. Only one man needed to place material in press.*

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Farquhar HYDRAULIC PRESSES

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Please send me a Farquhar Hydraulic Press catalog.

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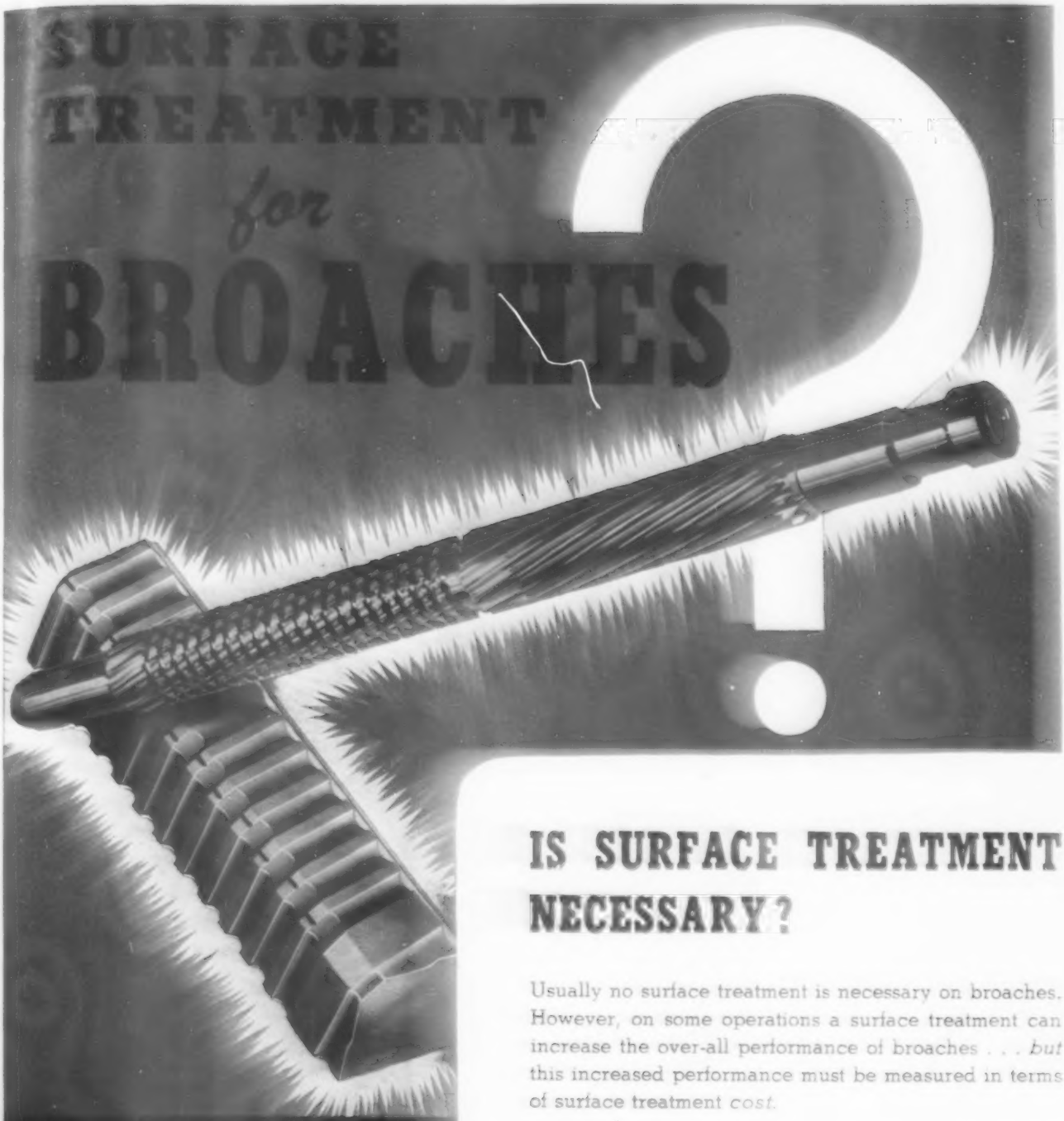

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OXIDIZING

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ELECTROLYTIC PLATING

IS SURFACE TREATMENT NECESSARY?

Usually no surface treatment is necessary on broaches. However, on some operations a surface treatment can increase the over-all performance of broaches . . . *but* this increased performance must be measured in terms of surface treatment *cost*.

No one treatment can be a "*cure-all*" . . . the one that produces the finest finish and longest wear life is dependent upon the particular job. The form, amount of stock removed and the material all must be considered.

Detroit Broach will assist you in deciding whether surface treatment is advisable and, if so, will assist in the selection of the proper type. This *individual* selection pays you greatest dividends.

DETROIT *Broach* COMPANY

20201 SHERWOOD AVENUE

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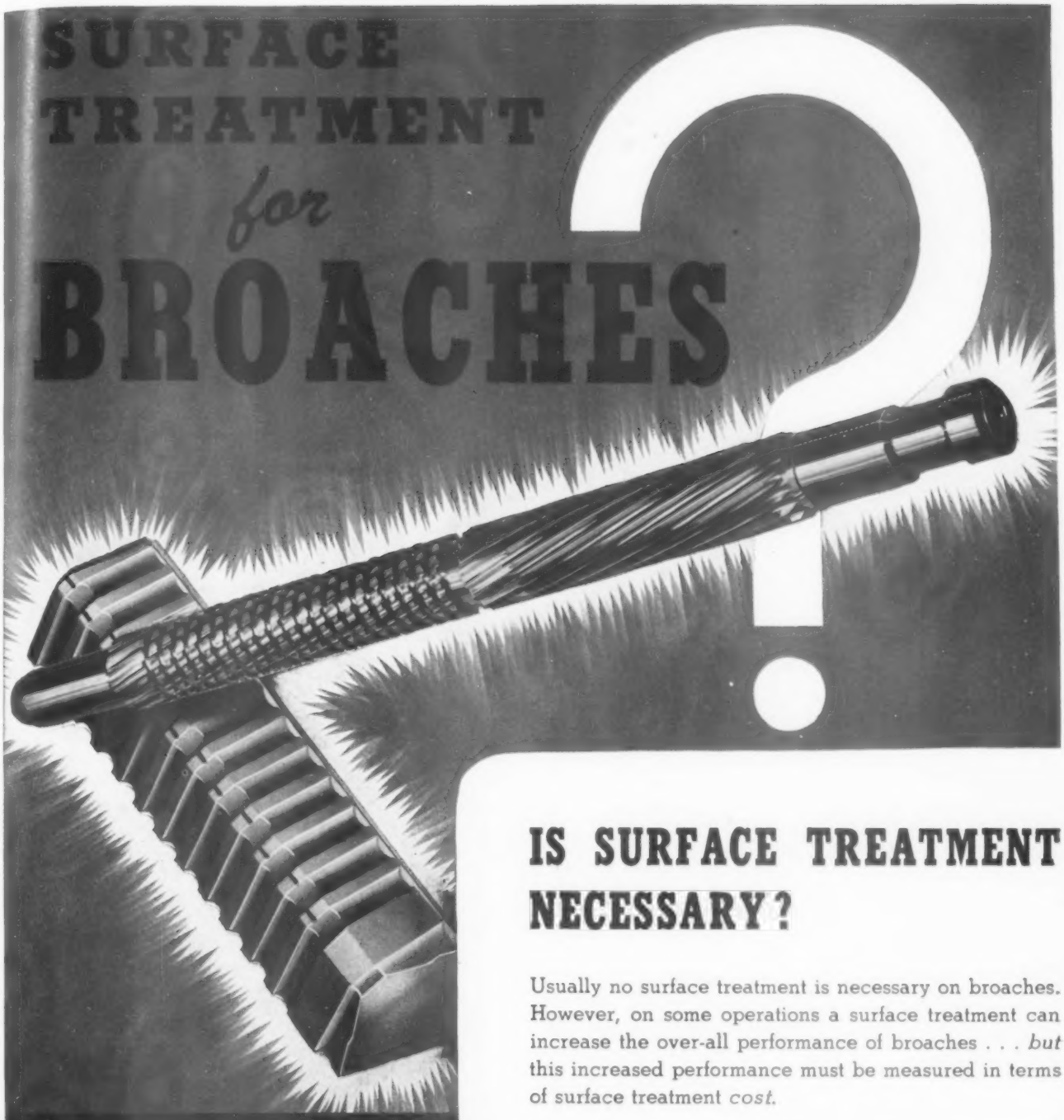

Detroit Broach is prepared to apply several types of surface treatment . . .

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Superhoned I.D.'s of UNIVERSAL DRILL BUSHINGS save you money on close work

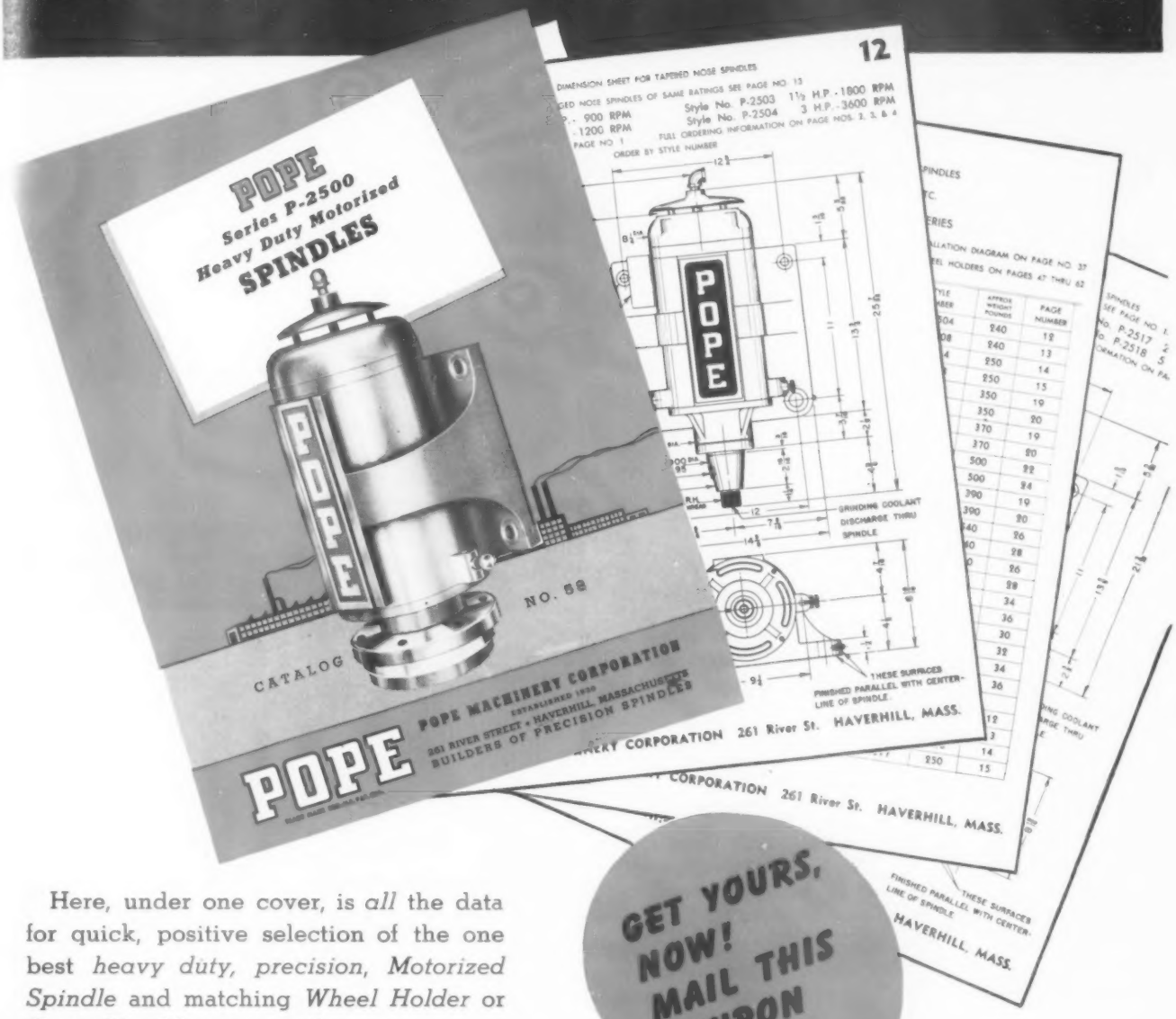
Superhoning makes the I.D.'s of Universal Standard Drill Bushings *extremely fine finished, extremely accurate.* This means longer bushing life for close work, as in reaming holes to ten-thousandths limits. Although the tool is guided accurately and rigidly, *it operates freely in the bushing with minimum wear,* which assures long bushing life. Available in standard and special types and sizes. For prompt delivery and for complete information on any tools in the complete Universal line, address the Universal warehouse nearest you—89 Main St., Ansonia, Conn., or 5629 Sixth St., Kenosha, Wisc. —or write direct to our home office.

EXPEDITE YOUR ORDER BY TELETYPE SERVICE.

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND EFFICIENCY IN YOUR PLANT

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 3, MICHIGAN

You need this New POPE SPINDLE CATALOG if you do any grinding, boring or milling



GET YOURS, NOW! MAIL THIS COUPON

Here, under one cover, is *all* the data for quick, positive selection of the one best *heavy duty, precision, Motorized Spindle* and matching *Wheel Holder* or Cutter Head for your work.

POPE Heavy Duty P-2500 Series Spindles with *Sealed-in Lubrication* are available from ¾ to 20 HP (special Spindles up to 75 HP), 900 to 3600 RPM.

It took months of engineering to develop this ready reference Catalog. It's all yours — to save your time and assure you fine finishes and fast removal of metal.

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No. 51

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Please mail me, without obligation or personal follow-up, a copy of your new CATALOG NO. 58.

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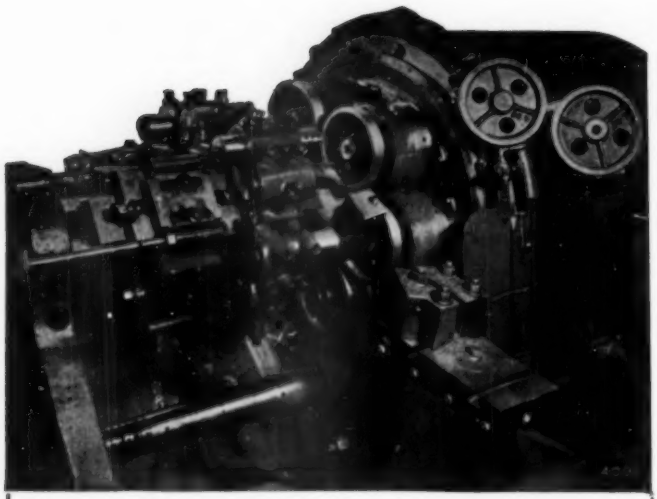


GEAR BLANKS ARE TURNED ACCURATELY AND SPEEDILY ON

"BAIRD" AUTOMATIC CHUCKING MACHINES

Here is shown a "Baird" No. 76H Chucking Machine, set up for turning, facing and boring gear Blanks made of a Special Cast Iron having a Rockwell hardness—85—90 B Scale.

The O.D. is finished turned to 6.800 plus or minus .001 and both faces are finished to 1.000 width, plus or minus .001.

The Hole is finished bored and reamed .750 diameter to plug gage and is concentric with the O.D. turning within .001 total indicator reading.

The work is held in Standard "Baird" Three Jaw Contracting Chucks, using stud type jaws for gripping. (The Spindle Turret is shown partially indexed to better illustrate the method of chucking.)

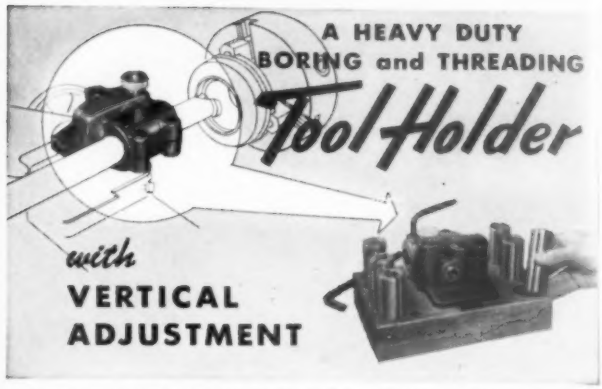
This gear is completely turned as shown to the required accuracy at the rate of 55 pieces per hour.

Selection of a spindle speed for each position, which is a special Baird Feature, permits high Spindle speeds in the finishing positions where carbide tools are used to produce the fine accurate surfaces required.

When you have Turning Operations that should be done profitably

"ASK BAIRD ABOUT IT."

THE BAIRD MACHINE COMPANY
STRATFORD, CONN.



It is designed to fit all sizes of Bokum Boring Tools up to No. 12 either direct or with split sleeve adapters. Greatly facilitates the accurate setting of tools to proper height.

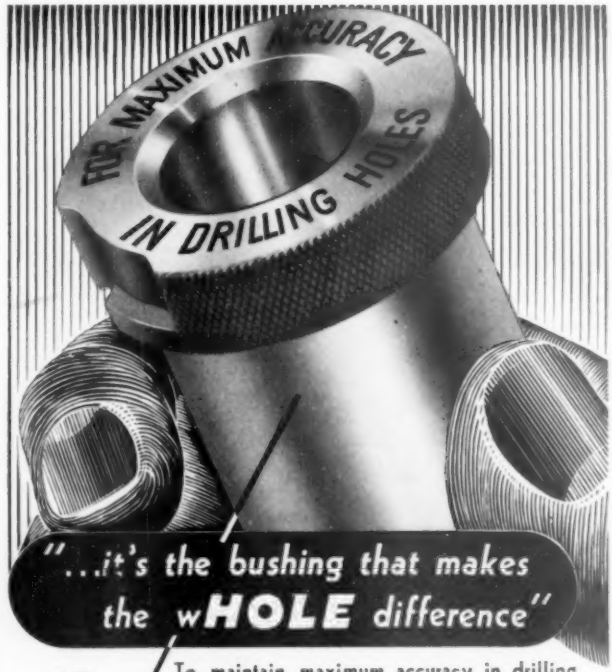
Complete set consists of holder and 6 adapters—compactly arranged in a handy box. Send for folder T-483.

This set, J-812, is composed of boring and facing cutters from No. 4 to No. 8 with 1 set of standard and 1 set of extra long shanks to fit ¾" boring chuck.

This set, J-1016, is composed of boring and facing cutters from No. 4 to No. 10 with 1 set each of standard and extra long shanks to fit 1" boring chuck.

Send for folder T-1139-6.

BOKUM TOOL CO.
TRADE MARK REG. U. S. PAT. OFF.
14775 WILDEMERE AVE. • DETROIT 21, MICH.
SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

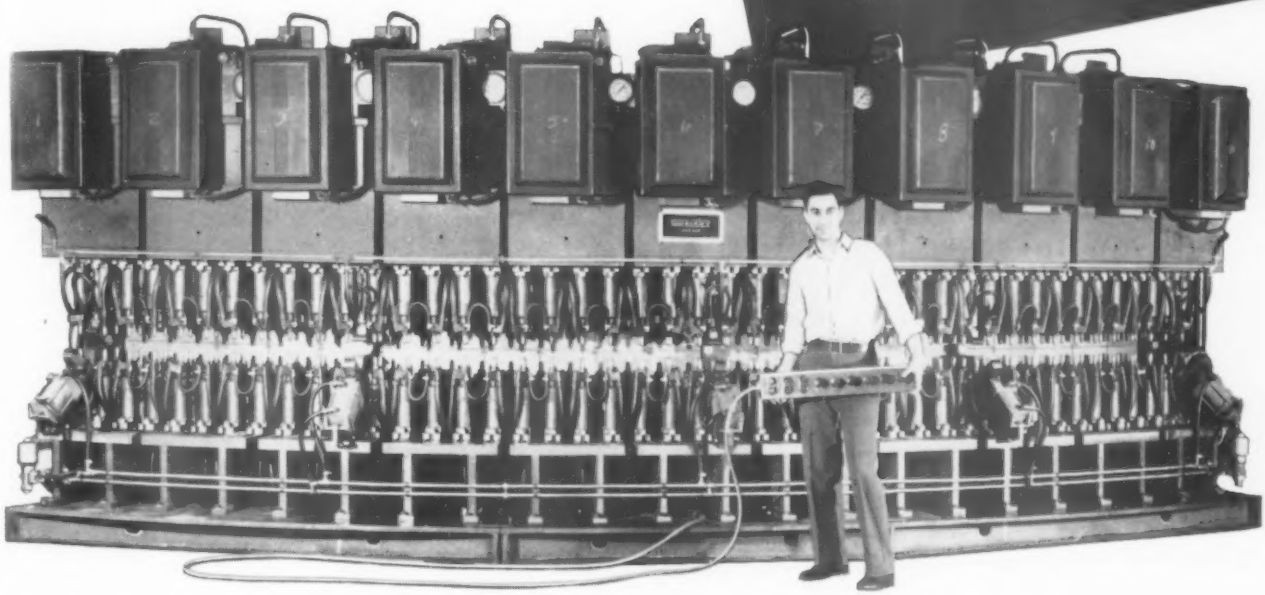


To maintain maximum accuracy in drilling operations, use the bushing that's precision made for the job...use Acme. Write for catalog.

Acme Industrial Company
Makers of Hardened and Ground Precision Parts
200 N. Laflin Street • Chicago 7, Illinois
THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

TAKING A BIG BITE OUT OF COSTS . . .

VICKERS HYDRAULIC CONTROLS



88 Spot Welds at ONE BITE

Curved steel ribs for Quonset Buildings are now produced on this 88-spot multiple head spot welding machine at rates as high as 85 complete arch ribs in 50 minutes. 88 spot welds at one time take a large bite out of the production costs.

The machine is divided into eleven sections, each complete with its individual Vickers Motorpump (see right) which supplies the oil pressure to the hydraulic cylinders that individually actuate each pair of electrodes. As a result, the electrodes are self-adjusting when tips wear . . . or when variations in stock thickness are encountered. The subdivision into eleven sections also provides flexibility in the event of change in the length or contour of the joist.

Sciaky Bros. Inc., Chicago, designed and built this unique machine. It is typical of what can be accomplished with Vickers Hydraulics as applied to special purpose high production machines. Consult the Vickers office in your area for information on how Vickers Hydraulic Equipment can improve your machinery. 3472

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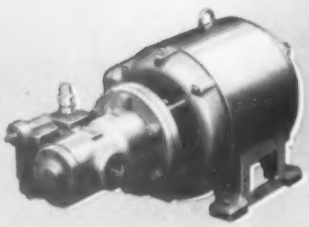
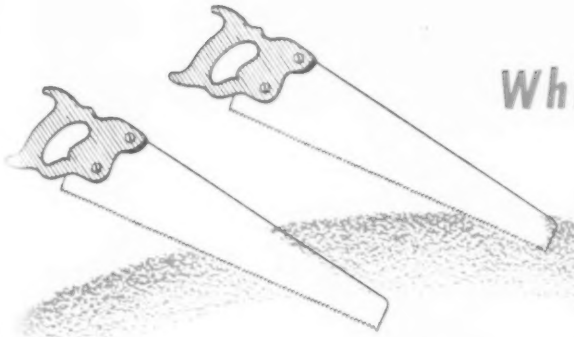


VICKERS MOTORPUMP
Double Pump and Combination Valve Unit

An exceptionally compact unit containing two Vickers Balanced Vane Type Pump Cartridges with the necessary auxiliary valving to provide the characteristics of a variable delivery pump having two preselected steps. Both low pressure and high pressure are quickly and easily adjusted to meet practically any working condition. Widely used for the numerous applications requiring relatively large oil volumes for fast traverse or fast closing movements, and relatively small volumes for feeding, clamping, holding, etc.

Built for continuous service at operating pressures up to 1000 psi and available in a wide range of size and control modifications. For additional information, ask for Bulletins 38-14 and 46-43a.



Which Saw will cut longer?

All saws look pretty much alike. But they don't cut alike. There's a big difference in cutting ability that can be discovered only by actual use.

Which CARBIDE will cut longer?

You may think "carbide is carbide" because they all look alike. Unfortunately, you can't SEE the difference in carbides—*it can be demonstrated only on your machines!*

Job records prove

3 to 10 times more pieces

with improved TECO *Cemented Carbide*

Improved TECO Cemented Carbide has remarkable resistance to wear and breakage in turning, boring and facing. Scores of plants report drastic production increases per tool.

PROVE IT YOURSELF. Tool up a machine on any carbide job, with Improved TECO. Run as usual. Check pieces per grind, grinds per tool, tool life, tool cost. Then run at higher speeds and feeds and note its unusual performance. When ordering, send details of machining set-up. Catalog and price list on request.

OPPORTUNITY FOR TOOL MANUFACTURERS **to cash in on fast-growing demand for TECO Cemented Carbide. Write us for full details.**

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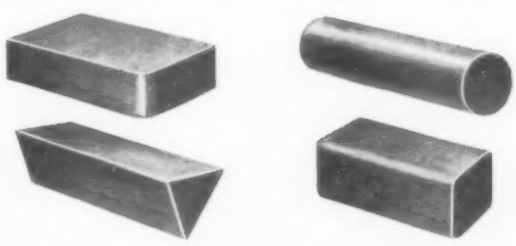
MILL SUPPLY HOUSES — **Territories open for line of standard TECO Cemented Carbide Tools. Write us.**

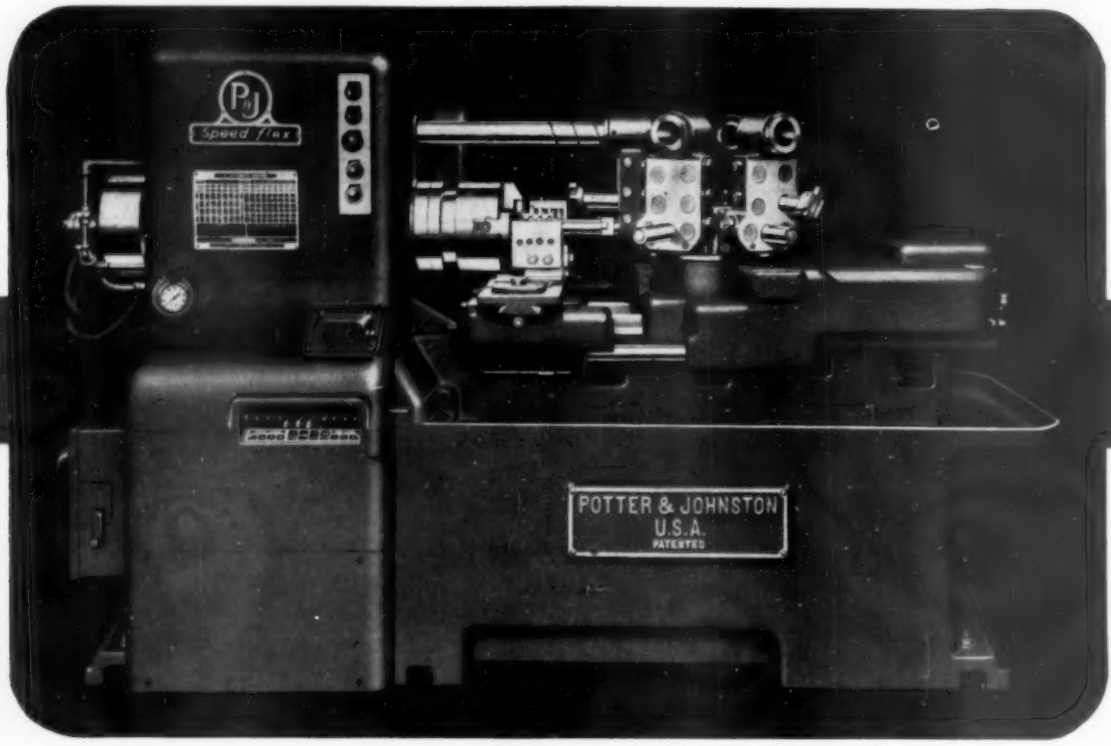
TUNGSTEN ELECTRIC CORP. 570 **39th Street, Union City, N. J. — Representatives: Indianapolis • Cleveland • Detroit**



IMPROVED TECO CEMENTED CARBIDE

Manufacturers of Tungsten Carbide — from ore to finished material — for over a quarter century

ome thumbnail notes on P.&J.'s 3-U SPEED-FLEX automatic turret lathe



High speed production unit . . . small size, wide range of operations . . . simple, convenient controls, quick chucking, speed and accuracy of all operations . . . machines small castings and forgings up to 6" dia. . . . occupies only 16 sq. ft. of floor space . . . machine is fully automatic . . . 6 turret faces simplify mounting of tools . . . 4 automatic changes of spindle speed . . . 3 automatic changes of feed . . . constant speed drive, silent chain connection . . . standard spindle speed range: 73 to 1445 rpm. . . . optional spindle speed range: 36 to 711 rpm.—73 to 1445 rpm. . . . turret has travel of 6" . . . electro-pneumatically operated clutches . . . h.p. required to drive: 5 . . . net weight: 5000 lbs. . . . boxed for sea shipment: 5700 lbs.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
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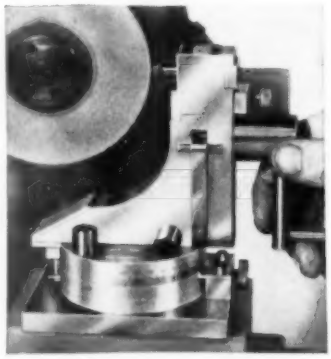
★ ★ ★ *Fluidmotion**

Simplest and Most Accurate Method of

FORM-DRESSING



● "Fluidmotion" Wheel Dressers generate wheel profiles in such a way that angles and radii flow into each other, without sharp changes of direction. Two angles and a radius can be dressed in one continuous motion—after only one setting of the dresser. "Fluidmotion" Dressers are made of the the finest chromium-molybdenum-vanadium alloy steels and have no wearing surfaces, as the gibs and V ways are positioning surfaces only and the dresser swivels on completely dust-protected ball bearings. Several models available. Model F, illustrated, is the smallest. 5" height to diamond center, dresses wheels up to 7" in diameter, profile radius up to 2". Write for booklet.

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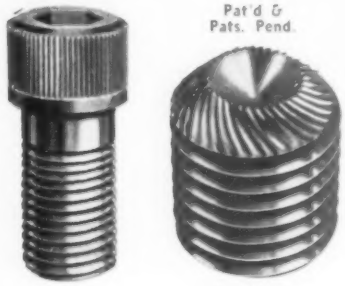

SOCKET SCREW PRODUCTS

(A) The *Knurled* Head of the "Unbrako" Socket Head Cap Screw prevents slippage—be the fingers and head ever so oily—therefore, it can be screwed-in faster and farther before a wrench becomes necessary . . . so assembly time and costs are cut. (B) The *Knurled* Cup Point of this "Unbrako" Socket Set Screw makes it a SELF-LOCKER because the knurls dig-in and stay-dug regardless of the most chattering vibration and therefore the "Unbrako" just won't shake loose. Can be used again and again. Sizes from #4 to 1½" in diameter—full range of lengths. Ask for the "Unbrako" Catalog.

**Knurling* of Socket Screws originated with "Unbrako" in 1934

Write for the name and address of your nearest "Unbrako" Industrial Distributor.

OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

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NEW High Speed Air Operated PRESSES

- *Model M-1* *1/2 Ton Capacity*
- *Model M-2* *1 Ton Capacity*

● *ELECTRIC PUSH BUTTON CONTROL*

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Designed and Built

to help you SPEED UP PRODUCTION

HERE'S help for manufacturers who want to speed up production on light stamping, press fit assembling, marking, die cutting, and similar operations. Take advantage of the opportunities offered by Hannifin's new high speed, air operated presses!

TWO MODELS: Model M-1 has 6" gap, develops 1270 lbs. ram pressure with 80 lbs. air. Model M-2 has 12¼" gap and 2650 lbs. capacity. Both moderately priced.

FAST OPERATION. Made possible by push button control through new electric solenoid valve. Stroke adjustable to work requirements. Every operating convenience.

QUALITY CONSTRUCTION. Built to big press standards for quality. Cylinder *"TRU-BORED"* and honed to satin finish. Working parts precision machined and finished. For information, see your local Hannifin representative or write for new bulletin NP-1007- J

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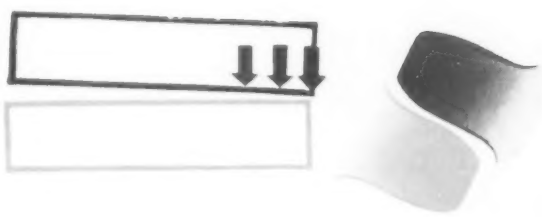
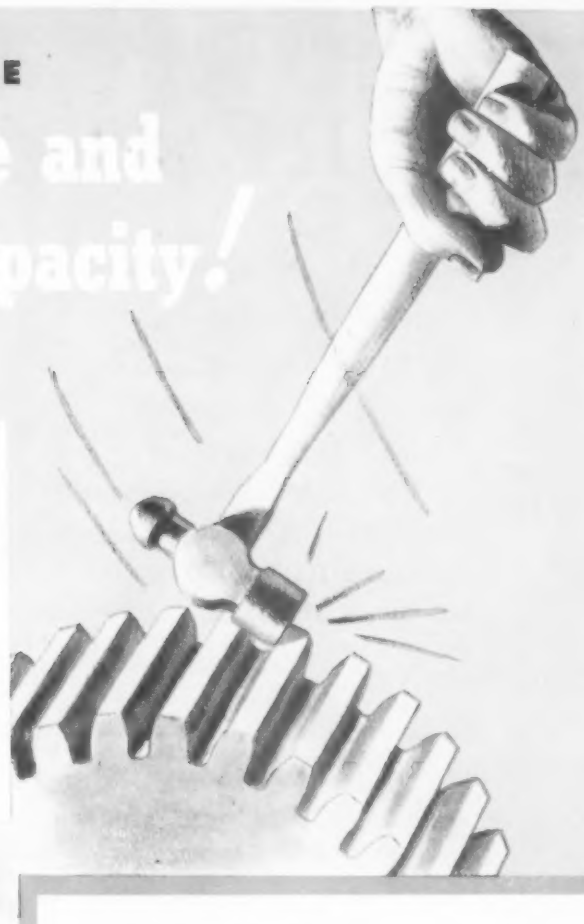
AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

THIS MECHANICAL PRINCIPLE

Prolongs gear life and increases load capacity!

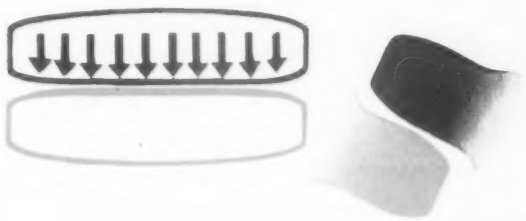


Pitch line section through two conventional teeth where a slight misalignment of the gears' axes throws heavy end bearing on both teeth.

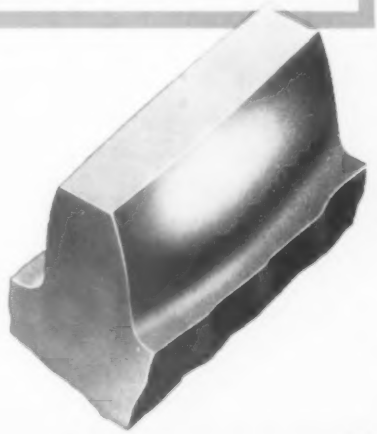


If you wanted to break a gear tooth, you could do it easier by hammering on one end rather than in the center of the tooth.

That is just what gear manufacturers want to avoid, so they prevent dangerous end bearing on gear teeth by shaving them to the Elliptoid form. Then slight misalignments due to deflections and manufacturing tolerances can't put critical loads on the ends of the teeth where they are most vulnerable. In other words, the specified lead tolerance is taken in a curved line rather than a straight one.



Similar section through two Elliptoid teeth. Although bearing extends across 85% of the tooth face, misalignment cannot impose end bearing on either tooth.



The Elliptoid or crowned tooth, exaggerated to illustrate the principle involved. Actual modification is normally less than .0005".

The Elliptoid gear tooth form is produced on Red Ring Rotary Shaving Machines. For further information, write for descriptive bulletin.

2868

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • • • • • • • DETROIT 13, MICHIGAN

SIMPLEX

Machining tubular parts where the bores must be concentric, the faces parallel, is a difficult job unless the work can be completed in one loading. When, in addition to machining the bores and faces you can also add the drilling and tapping operations in the same setting and provide for handling a variety of jobs in the same equipment, you have a production method that meets today's needs for quality and low labor cost.

The machine pictured is a SIMPLEX 4U 2-way Precision Boring Machine with four #4 spindles mounting combination boring and facing heads and also carrying unit type drilling heads with bushing plates for the drilling operation. By changing the fixtures, drills and boring tools, the various pieces illustrated can be handled with the same machine, thus this machine becomes in effect a production department in itself.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4528 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

the source

Crude abrasive is produced by our Canadian plant . . . refined, tested, processed in our Philadelphia factory . . . then used in manufacture of grinding wheels second to none in quality, performance and cost-cutting efficiency.

the products

Complete line includes Grinding Wheels, Mounted Wheels and Points, Segments, Abrasive Grain, Bricks and Sticks . . . known, proven products backed by Simonds Abrasive Company's reputation as a major manufacturer of grinding wheels and abrasives for over 50 years.

Borolon ALUMINUM OXIDE *Electroton* SILICON CARBIDE

SIMONDS ABRASIVE CO.

PHILADELPHIA, PA.

Grinding Wheels

Complete line includes every shape and size.

Abrasive Grains

Mounted Wheels and Points

Surfacing Segments

Bricks and Sticks

Available Everywhere

GRINDING WHEELS

where to get them

From your Simonds Abrasive Company distributor member of our distributor network serving key industrial centers here and abroad. He stocks Simonds Abrasive grinding wheels for every job and can advise you on wheel selection. Let us send you the name of the distributor in your area. Write now.

SIMONDS ABRASIVE CO.
Philadelphia, Pa.
Electric Furnace Plant, Simonds Canada Abrasive Co., Ltd., Arvida, P. Q.

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

Other Divisions:

SIMONDS STEEL MILLS
Lockport, N. Y.
Special Steels

SIMONDS CANADA SAW CO. LTD.
Montreal, Can.
Simonds Products for Canada

Whether you use portable, swing frame or floor stand grinders, Simonds Abrasive Company Grinding Wheels provide long lasting action, definite economy, over-all dependability on every job. It costs you nothing to consult a Simonds Abrasive Company engineer on your grinding problems. He can probably show you where you can save money through use of Simonds Abrasive Company Grinding Wheels adapted to particular conditions of your jobs.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

Index of Tool Engineer Advertisers

June, 1948

DEPEND ON EX-CELL-O

You don't take chances when Ex-Cell-O builds your aircraft parts and assemblies

Ex-Cell-O is a pioneer in bringing accuracy and high production to the manufacture of metal parts and assemblies for aircraft engine builders and other aviation industries. . . . Three huge Ex-Cell-O plants in Detroit have the most modern and complete facilities for rough and finish machining of precision parts from bar stock, forgings and castings, for heat treating all types of work in large or moderate quantities, for assembling parts with highly skilled supervision and inspection . . . all under one experienced, responsible management. Ex-Cell-O works exactly to the customer's specifications and ships the parts in whatever volume is required . . . Send Ex-Cell-O a sketch, sample part, or a blueprint for quotation, or get in touch directly with the Head Office Ex-Cello Corporation, 1200 Oakman Blvd., Detroit 32, Mi

Above: Aircraft gasoline injection nozzles such as those illustrated above are manufactured and assembled by Ex-Cell-O.

To left: Group of typical precision aircraft parts manufactured by Ex-Cell-O to customers' specifications and in any volume

Below: Individual parts of these aircraft sub-assemblies are manufactured by Ex-Cell-O to customers' specifications, then assembled, tested, shipped as complete units.

XLO

EX-CELL-O for PRECISION

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Other Special Purpose Machines • Standard Precision Boring, Turning and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Tool Grinders • Hydraulic Power Units • Drill Jig Bushings • R. R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Face Milling Cutters • Grinding Spindles

WARNING

Before you buy any screw machine

"Seeing is believing" has been a basic American philosophy for centuries. Most people didn't believe men could fly until the Wright brothers showed them. People questioned whether you could successfully combine sound with motion pictures until they saw their first talkie. Thirty years ago machine tool men wondered if our present high speed tools were practical. Today some feel the same way about carbides.

The dawn of all carbide tooling is here ... a reality now. Carbides have already revolutionized production standards on many machine tools in many shops. Brand new standards of speed and economy will become common sooner than you think.

Will this threaten your machine investment?

And do you know that *New Britain makes the only automatic screw machines originally designed from the ground up with the power, speed, weight and rigidity to get the full benefit with carbides?*

Before You Buy, Get the Full Story
Write for Descriptive Literature

KEY TO CARBIDES:

POWER:

40 h.p. practical. Higher power rating under development.

SPEED:

Thousands marvelled at the Chicago Show to see our Model 601 Six Spindle Automatic Screw Machine turn out brass valve stems at speeds in excess of 4,000 r.p.m.—3.2 seconds per piece including 1.2 seconds index time.

RIGIDITY:

Weights 16,000 lbs. (Model 601) to 23,000 lbs. (Model 602.) Direct camming eliminates deflection in all five heavy forming slides and main tool slide.

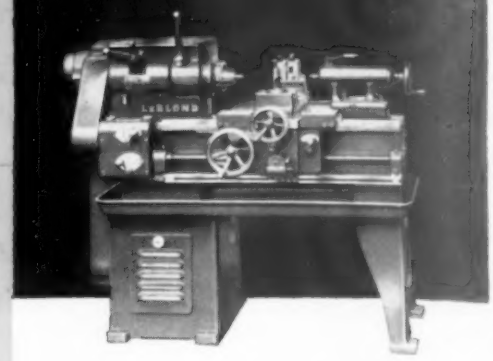
THIS ENTIRELY NEW LINE OF AUTOMATICS gives you full screw machine capacities with complete range of speeds and feeds for steel, aluminum and brass. (Large capacity, Model 602, illustrated with guards removed.) 648 MK1

THE NEW BRITAIN MACHINE CO. NB

NEW BRITAIN
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

New Britain Automatics Cost Less Per Finished Piece



get RAPID PRODUCTION
with LeBlond Rapid Production lathes

These speedy, low-cost lathes are LeBlond precision built to turn metal accurately and quickly—at the rate of 3600 rpm on one model. All three swing sizes—13", 17", and 20"—have set production records for manufacturers all over the world.

They're ideal for plain turning, facing, and boring of aluminum, brass, bronze, magnesium, plastics . . . where high spindle speeds and accuracy are required. Will turn standard ferrous metal as well.

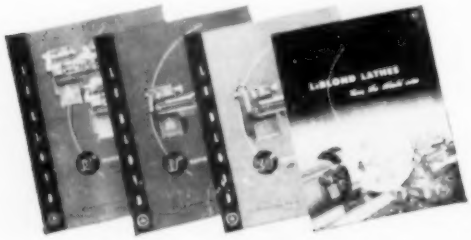
Hardened and ground steel bed ways front and rear now furnished at no additional charge.

You can solve your high speed production problem with a LeBlond Rapid Production Lathe. For further information, see our catalog in SWEET'S Mechanical Industries File, or

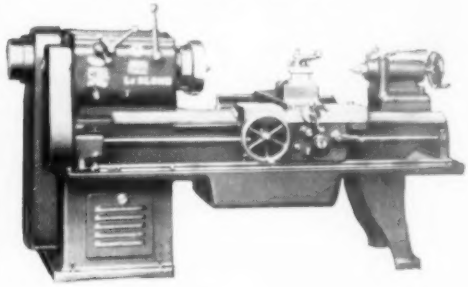
Send for illustrated bulletins.

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

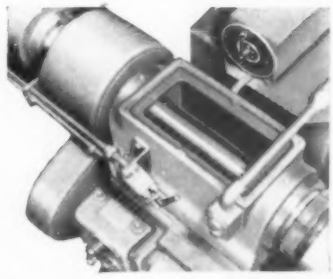
New York 6, N. Y., Singer Building, 149 Broadway. COurtland 7-6621
Chicago 6, Ill., 20 North Wacker Drive. STAte 5561
Philadelphia 40, Pa., Beury Bldg., 3701 N. Broad, SAgamore 2-5900
Detroit 2, Michigan, New Center Building, TRinity 3-5561



with your choice of 3 optional headstocks and many spindle speed ranges.



for high speed heavy duty metal turning.



also available like the 17" gearless headstock model shown above.

LeBLOND